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SOME PITFALLS IN THE ADMINISTRATIVE USE OF INTELLIGENT TESTS[1]

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As long as intelligence tests were used only by the psychologists who originated them, the public had little cause for alarm. In the laboratory and in the hands of trained specialists, mental examinations were not dangerous. Their significance and their limitations were appreciated, and such action as was based on them was reasonable and conservative. The possibility of measuring such qualities as mental capacity and intellectual alertness has aroused the public interest, however, and intelligence tests are now being applied in all parts of the country and by persons with little or no preparation for such work.

It is said to be extremely dangerous in certain parts of the world to walk through the open country at night, on account of the deserted mine-shafts and unprotected pits that await the feet of one who travels without a light. In order to insure one's safety in such a situation, there would be three main possibilities: one might secure an adequate lantern to light his path; he might sit down patiently and wait for daylight before going further; or he might move forward slowly and cautiously, feeling out each step in advance of taking it.

The dangers that beset the path of would-be mental examiners are of much the same nature. There are pitfalls on every hand. Unless his eyes have been opened to these dangers by thorough training and extensive experience, one should not at-

[1]Address delivered before the joint meeting of the Department of Superintendence and the National Society for the Study of Education held at Chicago, February 28, 1922.

tempt to give intelligence tests. If the attempt is made, it should be made with extreme caution. It would be much better to wait for expert guidance in this field than to plunge blindly ahead and thereby involve scores of innocent boys and girls in an educational and vocational snare, which would affect their lives profoundly and in many cases permanently.

One of the sources from which school officers have drawn their ambition to use intelligence tests in administrative work, has been the success of such tests in classifying hundreds of thousands of recruits in the United States Army. I was closely connected with the army experiment. The success of the tests in military camps was a relative matter. The mistakes that the psychological examiners might make were less serious than those that were certain to be made by the unsupported guesses of military officers, who for the most part were wholly unacquainted with their men.

In the army we were classifying adult men for temporary service, but in the schools we are classifying immature boys and girls, with the frequent assumption that the assignments made will hold for the entire period of their school courses, if not for life. The work in the army camps was carried on, or at least carefully supervised, by trained psychologists. Much of the work in schools, however, is being done by teachers and principals who have almost no special training or experience in this field. It is time, therefore, for us to make a careful examination of the premises and to discover the pitfalls that beset this relatively uncharted path.

Pitfalls in One's Understanding of the Nature of the Tests

An inadequate understanding of the scope and significance of the tests may lead to serious difficulties. "Intelligence" is a big word, and it signifies to the average person a broad range of abilities. Each of the group intelligence scales at present available involves only a few of these abilities, and no two of these scales measure exactly the same combination of qualities. We

know very little about the specific traits that should be included in a comprehensive test of *general intelligence*, and still less about the relative weight that should be attached to the different tests to be included. We are certain that we do not yet have any system of tests in which exactly the proper elements are combined in exactly the proper proportions to make a perfect test of general intelligence. What then do the intelligence tests actually measure? What are the criteria by which we are judging the intelligence of pupils?

As teachers, we tend to think of intelligence in the rather narrow terms of school success. The child who prepares his lessons easily and well is "intelligent." The one who has difficulty in understanding words, symbols, and complex ideas is "rather stupid." Practically all of the present intelligence tests are built on the assumption that success in school work is only another measure of intelligence. The pupils who make high scores on the intelligence tests are the ones who enjoy and can easily master the books and abstract ideas offered in the schools.

Miss Gambrill has recently demonstrated that successful business men do not usually come from the group of honor students at college. The men who win Phi Beta Kappa keys and high grades in their college studies do not win the largest incomes after graduation. Those who win the large incomes after graduation tend to come from the students who make only average grades in college work. The honor students in college tend to become teachers. In other words, the ability to make a favorable impression on college instructors, through brilliant recitations and excellent examination papers, is exactly the same ability as the instructors themselves possess. In assigning grades for success in school or college work, one tends to rate very high those whose abilities are like his own and to rate lower those who are mentally less like him. Is it right, however, for us to go still further and say that those who are unlike us in their abilities are less intelligent?

I know of a woman, forty years of age, whose rating on the intelligence tests is about equivalent to that of a fourth-grade

school pupil. In actual fact she gave up school work when she had reached the fifth grade, because she did not care for the things she was learning. She is now a successful American business woman, in spite of having been left alone in the world with no money and with an I. Q. of not more than 75. At the present time she is the owner and manager of a small factory. For several years she was the housekeeper at one of the finest Fifth Avenue hotels, where she successfully directed the work of a corps of approximately fifty maids, three carpenters, two decorators and a plumber. In spite of the evidence of the tests, I insist that she is intelligent.

It is certainly a mistake to claim that the group tests used in our schools are measures of *general* intelligence. After all, is it general intelligence that we wish to measure? Is it not really more important for our purposes to measure the specific type of intelligence which enables children to succeed in the kind of work offered by the schools, than to measure intelligence in general? A test of general health, which gave no more specific information than that the patient was "very sick," would not be any more useful in medical practice than a general intelligence test would be in educational practice. The good physician seeks for specific symptoms rather than for general conditions. As I see it, the school administrator would do well to acknowledge frankly, when he uses a group intelligence test, that he is measuring certain elements of a relatively specific ability to do abstract thinking with words and symbols. Such an acknowledgment would go far toward clarifying the issues raised by the results of tests.

In view of the specific nature of the intelligence tests, it is unfortunate that the custom has grown up of speaking of one child as "superior" to another, when the only evidence of such superiority is that he has made a larger score on a given test. The evil of this custom is more clearly seen when one child is reported as "inferior" to another. How do we know that the perfect all-round intelligence test might not weight social intelligence, or mechanical intelligence, or some other type of ability, much more heavily than the academic type we now can

measure? Do we know that the child making a low score in abstract intelligence might not be rated much higher if measured by a truly general intelligence test? The words "superior" and "inferior" give far too great an importance to the type of tests that are now available. College graduates in business make a higher score, on the salary scale, than college graduates in education, but we do not for that reason need to speak of one of these groups as superior to the other.

There is one further danger of misunderstanding with regard to the character of intelligence tests. Studies of their correlations have proved that they predict success in school more accurately than it is predicted by the judgment of the average teacher. As a consequence of this, there has been a tendency to say that the results of intelligence tests should therefore be used as the basis for the promotion and classification of pupils, more or less regardless of the judgments of teachers. This tendency must be corrected. Intelligence test scores should never be substituted for common sense and good judgment. The tests should supplement the teacher's judgment but should not take its place. Where common sense and reason seem to oppose the evidence of the tests with regard to a pupil, the tests should not be accepted as conclusive. The time may come when an intelligence test score may be trusted, even though it contradicts the thoughtful judgments of teachers, but that time is not yet.

Pitfalls of Exaggerated Confidence in the Accuracy of the Tests

The very language in which the results of tests are discussed affords numerous pitfalls, since it tends to create an unwarranted confidence in the accuracy of the instruments used. The word "measurements," which has come to be applied to the results of almost any test, suggests a high degree of accuracy which cannot always be justified. When one goes still further, however, and claims that his test results are "scientific measurements," there are few indeed who dare to suggest the extent to which other equally scientific measurements might disagree, especially as regards the abilities of individual pupils.

This suggestion of extreme accuracy in test results is further exaggerated by the numerical character of the scores obtained. A pupil is reported, for example, as having a score of 63 on the National Intelligence Test, while 72.4 is reported as the average score of his group. The difference between this pupil's score and his group average may then be calculated and further elaborate analysis made, as though 63 were an absolutely accurate point, which belonged to the pupil as intimately and constantly as his name or the number of inches in his height.

The mental examiner for a private school in New York City informed me last week that she was afraid to give a second intelligence test to her pupils, for fear it would give different results from the one given last September. Said she, "We classified all our pupils on the basis of their scores in the Otis Tests, and I am afraid the patrons would lose their faith in the accuracy of intelligence tests if a second trial should disagree with the first." Such a remark well illustrates the unwarranted confidence that has been built up, all too generally, in the accuracy of the tests. The sooner this over-confidence is broken up, the better for the future of intelligence testing and intelligence testers.

Another source of false confidence has been the adoption, by the makers of group tests, of the Intelligence Quotient technique, devised by Terman for the Stanford Binet Examination. The truth of the doctrine of the constancy of the I. Q. has not been sufficiently demonstrated in the case of the Stanford Examination itself, but as soon as its truth is asserted in connection with the far less accurate group examinations, a sad state of affairs has been reached in the science of mental measurements. In hundreds of cases, however, pupils have been tested by a group intelligence test, the accuracy of which even the examiner himself would question, after which ratios and quotients have been worked out to the second or third decimal point. All too frequently these derived measures have been discussed and used in administrative reclassifications, as if their accuracy were open to no question or doubt whatever.

Examples of this over-confidence in the accuracy and finality of intelligence tests can be found wherever such tests have been

used. In one of the best private schools in New York City, a third-grade pupil who was leading her class and whom the teacher recommended for special promotion was not allowed such a promotion, because it was learned, forsooth, that as a kindergarten child her I. Q. on the Stanford Examination had been found to be only 89. If this I. Q. had been obtained by using one of the various group tests of intelligence, the administrative action would have been still more unwarranted. Unless one is willing to re-examine and to reclassify pupils whenever new and more reliable evidences of ability have been discovered, he might better leave the intelligence tests strictly alone.

A word should be said at this point about the use of the phrase "Intelligence Quotient" or "I. Q." If this stands alone and unidentified, one naturally assumes that it refers to the Stanford Revision of the Binet Scale. A quotient obtained from the Otis Tests, for example, should be clearly identified as such. Likewise with "Mental Age" scores, it is naturally assumed that a pupil reported as having a given mental age was examined by the Stanford Binet Scale. If the age score was obtained from the National Scale A, it should be clearly identified as a "National Scale A Mental Age." Unless all such derived scores are thus identified, as "Miller Mental Ages," "Dearborn Intelligence Quotients," and "Otis I. Q.'s," it will be impossible for other persons than the original examiner to form a correct idea of the significance and accuracy of such measures.

Pitfalls in Reasoning from the Results of Tests

A third type of error is due to loose reasoning about the results of tests. False inferences are too often drawn from the scores obtained. It is quite common, for example, to assume that pupils who make low scores in a so-called intelligence test would succeed relatively better along trade lines, in manual arts, or in unskilled labor. Perhaps they would, but the low scores in the abstract tests do not prove it. The absence of one type of ability does not insure the presence of another. Until adequate tests for the purpose have been applied, the presence of a capac-

ity for manual skill, or the possession of any other type of ability, can be proved at the present time only by an actual try-out of the pupil in the field concerned. Any assignment of a pupil to such "practical studies" on the basis of demonstrated inability to deal with abstract symbols and ideas should be only tentative. Permanent assignment to a course should not be made until after ability in that particular line has been proved.

Another false conclusion, drawn from the results of the so-called intelligence tests, is that pupils who make scores of a certain size will not profit by further training. The tests used are measures of a specific type of ability,—the type which enables pupils to succeed at the academic work offered in the usual public school. If a child makes a low score in the tests, it does not follow that it is useless to train him. The child may indeed have reached his maximum level in abstract work with symbols and words, but there remains an endless number of avenues through which he may broaden his experience and enrich his store of knowledge, even at his relatively low level of abstract thought. There may be other fields of training, also, in which such a child may demonstrate a relatively higher level of ability. It is certainly unfair to refuse further training to a child because the school has in the past failed to recognize the needs of pupils of his type.

At the other extreme there is a pitfall of just as serious a nature,—the assumption that those who make high scores on the so-called intelligence tests do not need special attention or training, because they will take care of themselves. It is true that pupils with great ability as shown by these tests are usually able to master the ordinary school subjects with little effort and great speed, but unless they are stimulated and directed they do not develop as they should along the lines for which their special abilities fit them. Stenquist has recently found a negative correlation of 0.40 between effort and intelligence, both qualities in several hundred pupils being measured as accurately and objectively as possible.

The pupils with high abstract intelligence test scores learn

what is offered for the average pupils and then loaf. Their need is not merely for more work but also for a different type of training. The average citizen needs to be taught how to verify the information supplied by books, magazines, newspapers, and research workers, and how to judge and select the ideas by which the democracy he controls is to be guided. But the ideas from which the average citizen is to choose, and the researches by which information is to be obtained, will be produced by the few who enjoy and are successful in dealing with abstract matters. These few may be detected early in life by means of the present abstract intelligence tests. The present tests will not, however, certify potential leadership in social, political, or industrial life. Other tests will have to be devised for these purposes. Each pupil, whatever may be the character and degree of his natural gifts, must be given training of such a nature as will give the utmost possible return to the community from his particular intellectual endowment.

Pitfalls in the Treatment Applied to Conditions Discovered by Tests

The most serious pitfalls of all are those concerned with the treatment applied to situations revealed by intelligence tests. As long as one does nothing but talk or think about the results of such tests, he is not likely to do a great deal of harm, unless someone else hears and acts upon his thoughts.

First of all, an administrative officer in a school system should recognize that any re-organization of classes or reclassification of pupils which he may make with the aid of intelligence tests is not in itself a desirable educational objective. When pupils have been sorted into homogeneous groups, they have not thereby been improved. Tests of ability along various lines, and the grouping together of pupils of like abilities, furnish a starting point and an opportunity for an educational program that will lead pupils to success and happiness rather than to failure and discouragement; but they do not in themselves provide such a program. All of the intelligence, patience, and skill of a competent corps

of supervisors will be needed to develop and to carry on such an enterprise. It will not run automatically.

As soon as one begins to make administrative use of the intelligence tests, teachers and supervisors must be trained to make proper adjustments of their instruction to the characters and abilities of their groups. This is not an easy task. There will be a strong tendency for teachers to slip back into the more traditional ways of dealing with their classes. Supervisors will need to remind the teachers constantly of the special opportunities they wish to provide for the pupils so unusually well-examined and classified.

In many cases teachers will have to alter not only their methods but their social attitudes and their conceptions of democracy. Instead of trying to turn the eyes of all their pupils toward academic work or the learned professions as the ultimate goal in life, they must recognize and teach that effective service to the community is the highest ideal. It must be clear to them that it is just as noble and worthy to be an efficient butcher or teamster as to be a good teacher, or indeed, that an effective street-sweeper may actually be worthy of more public honor and respect than a successful lawyer.

Above all, teachers must cease thinking and speaking of the "higher professions" when referring to types of work similar to their own. The only sense in which one man's work is "higher" than another's is that, considering his talents, the one is contributing more effectively than the other to the common welfare. Teachers must recognize and train other types of ability than those measured by the present abstract intelligence tests, and there must not be any suggestion that those whose abilities are different from their own are of a "lower order." The early discovery of the type of ability possessed by a pupil must be recognized as making possible for him a freedom from failure in lines not suited to him, and as providing him with greater rather than smaller opportunities for *effective* training.

Each pupil must come to think of failure to measure up to his own possibilities as the great defect. He must honor every

other person who, for the good of the community, is making the most of his talents, regardless of the nature of those talents. Those few pupils whose inheritance makes it possible to train them to think original thoughts are not, on that account, entitled to any greater respect or to any less attention than the more numerous pupils who must be trained to judge and select carefully the thoughts and ideals upon which to base the activities of the social organization to which all belong and for which all are laboring. The inferior person must be recognized by all as the one who does less than his own best.

Such a program requires time. It also requires an enormous amount of sound common sense, a broad social philosophy, a thorough training in psychology and scientific method, and an infinite patience. For the present, and until the science of mental measurements is much older, more highly developed, and better understood, the psychologists and the school administrators must cooperate at every step. Each needs the constant assistance of the other, if the pitfalls that surround the administrative use of intelligence tests are to be avoided. For the sake of the pupils and for the safety of democracy, psychologists and administrators must continue to work hand in hand. "United we stand, divided we fall."

A STUDY OF READING AND SPELLING WITH SPECIAL REFERENCE TO DISABILITY[1]

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The purposes of this investigation were as follows: (1) to devise, as well as we could, a technique for the diagnosis of disability in reading and spelling; (2) to discover the constituent factors involved in acquiring these functions by a study of both good and poor readers; (3) to ascertain the causes of such disabilities as were found; and (4) to try out certain remedial forms of instruction.

For this purpose approximately 135 cases of whom 25 or 30 may be considered as "seriously" retarded in reading or spelling, or both have been studied in detail. Very few of the subjects were of less than average intelligence. (See Table I).

TESTS AND EXAMINATIONS GIVEN

I. Tests of General Mental Ability.
   1. Stanford-Binet, most subjects.
   2. Nine group tests, all subjects.

II. Tests of Achievement in Reading, Writing, Arithmetic, and Spelling.

III. Tests of several forms of Visual Perception.
   1. Ability to detect small differences between pairs of printed materials: four tests, employing as materials, pictures, digits, nonsense material, and words.
   2. Ability to detect one printed form among several others: four tests, geometrical figures, A.'s, K. I.'s, and digits.
   3. Ability to recognize the correct form of a word among incorrect forms—recognition spelling.
   4. Proof-reading test.

IV. Ability to pronounce single words (pronunciation test devised by the writer) and to read orally (Gray's Oral Reading Test).

V. Rate and Depth of Comprehension of words and sentences.
   1. Holley's Visual Vocabulary Test and a similar test arranged by the writer.

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[1] A paper read at the meeting of the National Association of Directors of Educational Research in Chicago, March 1, 1922. The study is a contribution of the Department of Educational Research of the Scarborough School, Scarborough, New York.

2. The Burgess, Brown, Courtis, Monroe, Thorndike-McCall Reading Tests and the Woodworth-Wells Direction Test.

VI. Spelling Tests.
1. A select list of 36 words for oral spelling, given individually.
2. A select list of 36 words for written spelling, given individually.
3. Sentences for dictation; written spelling.
4. A composite of spelling ability comprising 186 words from various columns of the Ayres-Buckingham Scale.

VII. Understanding of Spoken Language.
1. Terman's Oral Vocabulary Test.
2. Oral sentences and directions.

VIII. Tests of the Sensory and Motor Mechanisms.
1. Tests of vision and hearing.
2. Tests of general motor control, writing ability, and articulation.
3. Eye-movements in reading.
4. Lip-movements, etc., in reading.

IX. Emotional, Temperamental, and Other Traits.
1. Inertia, laziness, disinclination.
2. Instability.
3. Poor health, etc.

The following methods of analysis were employed: (1) analysis of group relations by means a simple, partial, and multiple correlations;[2] (2) a comparison of the achievements of the backward cases with those of the normal cases in the several tests; and (3) an analytical study of the responses of backward cases in certain individual examinations.

Limitations permit only the briefest summary of some of the outstanding conclusions, in most instances without a presentation of the substantiating evidence which will be published in detail later.[3]

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[2] The Pearson products moment formula for simple correlations and Kelley's procedure for partial and multiple correlations were used. Kelley, T. L., *Tables to facilitate the calculation of partial coefficients of correlation and regression equations*, Stanford University Publications in Education, Vol. I, No. I, 1921.

[3] In a forthcoming monograph in the *Teachers College Contributions to Education.*

Defects Associated with Disability in Reading

Defects or deficiencies of the central nervous system

General Mental Ability—That the relation between general mental ability and these verbal functions is close, is well known. Terman, Burt, Tredgold, and others find that it is quite futile to attempt to teach children or adults with I. Q.'s of 0.60 or less to read; in fact, an I. Q. of 0.70 may be considered a minmum essential.[4]

In the present investigation no attempt was made to ascertain the minimum intelligence for reading; we sought rather to eliminate this factor as a cause of disability. The following distributions (Table I) shows the I. Q.'s of those measured by the Stanford-Binet Test. The average is about 116. Those not measured by the Stanford Test had at least average intelligence as indicated by group tests.

TABLE I.—DISTRIBUTION OF I. Q.'S AMONG SUBJECTS TESTED

Stanford I. Q.	80–89	90–	100–	110–	120–	130–	140–	150–	160 and Over	Total
Number of Cases	2	8	21	22	19	12	2	4	1	91

TABLE II.—CORRELATIONS OF COMPOSITE OF READING ABILITY WITH INTELLIGENCE

Grade	Stanford Mental Age	Verbal Group Intelligence	Non-Verbal Group Intelligence
III	0.30	0.70	0.15
IV	0.35	0.60	0.24
V	0.58	0.65	0.28
VI	0.71	0.77	0.26
VII	....	0.75	0.17
VIII	....	0.80	0.05
Mean	0.49	0.71	0.20
M. D.	0.16	0.06	0.07

[4]Terman, L. M. *The measurement of intelligence.* pp. 266ff. Burt, Cyril. *Mental and scholastic tests.* London, 1921.

TABLE III.—CORRELATIONS OF COMPOSITE OF SPELLING ABILITY WITH INTELLIGENCE

Grade	Stanford Mental Age	Verbal Group Intelligence	Non-Verbal Group Intelligence
III	0.32	0.56	0.13
IV	0.11	0.33	0.18
V	0.37	0.26	0.21
VI	0.45	0.43	0.18
VII	....	0.44	0.12
VIII	....	0.50	0.08
Mean	0.31	0.42	0.15
M. D.	0.11	0.08	0.04

TABLE IV.—AVERAGES OF THE CORRELATIONS FOR GRADES IV TO VIII, INCLUSIVE

Tests	Detecting Small Differences Between Pairs of Tests				Cancellation Tests			
	V-1 Pictures	V-2 Digits	V-3 Nonsense	V-4 Words	V-5 Figures	V-6 A's	V-7 K. I.	V-8 Digits
V-1 Pictures	...	.04	.08	.06	.26	.13	.12	.04
V-2 Digits	.04	...	.27	.20	.19	.24	.23	.43
V-3 Nonsense	.08	.27	...	.46	.23	.21	.23	.24
V-4 Words	.06	.20	.46	...	.10	.14	.05	.11
V-5 Figures	.26	.19	.23	.10	...	.32	.24	.39
V-6 A's	.13	.24	.21	.14	.32	...	.58	.46
V-7 K. I.	.12	.23	.23	.05	.25	.58	...	.35
V-8 2, 3,	.04	.43	.24	.11	.39	.46	.35	...
Mean	.10	.23	.25	.16	.25	.30	.26	.30

Even when these superior children are taken in grade groups, in which the range is very narrow, the correlations of general mental ability of the verbal type with reading and spelling are substantial. In Tables II and III the variables are: (1) Stanford-Binet, requiring about an hour of time; (2) a selection of very *verbal* exercises from group tests listed above to require an hour; and (3) a selection of very *non-verbal* exercises to take an hour. The correlations are similar to those usually found.

It is, however, a notable fact that children of superior intelligence, some of them having I. Q.'s of 120 or more, should have experienced extreme difficulty in learning to read.

Defects or Deficiency in Visual Perception.—Ten tests of visual perception (see division III in the list above) were used. The correlations shown in Table IV are low except where the materials were the same or similar. The implication is that there is no 'general perceptual ability' but many relatively specific perceptual abilities; as many, in fact, as there are classes of items, namely, letters, words, digits, geometrical figures, etc.

Detailed study, of both good and poor readers and spellers who do poorly in all perceptual tests discloses the fact that inadequate vision, eye muscle control, sluggishness of motor reaction, inability to attend persistently, etc., rather than any defect of 'general perceptual ability' are causal. When these factors are eliminated, the non-readers and non-spellers were quite as good as the others in perception of all items except words. The abilities to perceive digits, figures, etc., show very low correlations with reading and spelling.

The several tests involving words show high intercorrelations as shown in Table V. They are also substantially correlated with reading and spelling. By the technique of partial and multiple

TABLE V.—CORRELATIONS[a] OF SPELLING AND READING WITH OTHER VARIABLES

	With Spelling	With Reading	Recognition Spelling	Proof Reading
Test V-1, Small differences in drawings...	–0.04	0.05	0.01	0.15
Test V-2, Small differences in digits.....	–0.05	0.14	0.01	0.09
Test V-5, Cancellation, geometrical figures	0.14	0.16	0.13	0.17
Test V-6, Cancellation, A's.....	0.17	0.14	0.13	0.16
Test V-7, Cancellation, K. I.....	0.04	0.04	0.17	0.09
Test V-8, Cancellation, 2, 3,.....	–0.03	0.11	0.08	0.11
Test V-3, Small differences, nonsense.....	0.35	0.27	0.32	0.35
Test V-4, Small differences, words.....	0.55	0.39	0.47	0.56

[a] r is the mean of the r's for Grades III to VIII.

TABLE VI. SIMPLE, PARTIAL, AND MULTIPLE CORRELATIONS BETWEEN THE VARIABLES (1) READING, (2) RECOGNITION SPELLING, (3) PROOF READING, AND (4) ABILITY TO DETECT SMALL DIFFERENCES BETWEEN WORDS

Simple Correlations	Partial Correlations First Order	Partial Correlations Second Order
$r_{12} = 0.47$	$r_{12.3} = 0.31$	$r_{12.34} = 0.26$
$r_{13} = 0.45$	$r_{13.2} = 0.26$	$r_{13.24} = 0.19$
$r_{14} = 0.39$	$r_{13.4} = 0.30$	$r_{14.23} = 0.12$
$r_{23} = 0.53$	$r_{14.2} = 0.22$	
$r_{24} = 0.47$	$r_{14.3} = 0.19$	
$r_{34} = 0.56$	$r_{23.4} = 0.37$	
	$r_{24.3} = 0.24$	
	$r_{34.2} = 0.42$	

Multiple Correlations

$R_{1.23} = 0.524$

$R_{1.234} = 0.54$

correlations (see Tables VI and VII) a factor appears, which is common to these functions and sufficiently important to give substantial correlations, other things being eliminated. By hypothesis, this common factor is defined as an ability to perceive clearly the significant details of words. This hypothesis was verified by a series of analytical studies of poor readers.

The multiple correlations of the perception tests with spelling (Table VII) are higher than those with reading. This suggests the possibility that those subjects who possess a

TABLE VII.—SIMPLE, PARTIAL, AND MULTIPLE CORRELATIONS BETWEEN THE VARIABLES, (1) SPELLING, (2) RECOGNITION SPELLING, (3) PROOF READING, AND (4) ABILITY TO DETECT SMALL DIFFERENCES BETWEEN PAIRS OF WORDS

Simple Correlations	Partial Correlations First Order	Partial Correlations Second Order
$r_{12} = 0.63$	$r_{12.3} = 0.54$	$r_{12.34} = 0.50$
$r_{13} = 0.39$	$r_{12.4} = 0.50$	$r_{13.24} = -0.08$
$r_{14} = 0.55$	$r_{13.2} = 0.09$	$r_{14.23} = 0.38$
$r_{23} = 0.53$	$r_{13.4} = 0.12$	
$r_{24} = 0.47$	$r_{14.2} = 0.37$	
$r_{34} = 0.56$	$r_{14.3} = 0.44$	

Multiple Correlations

$R_{1.24} = 0.69$

$R_{1.234} = 0.69$

very favorable form of word perception are, to some extent, learning (or relearning) to spell during the course of ordinary reading. This conclusion is implied, but not proved, by the fact that very poor readers were invariably very poor spellers, although there were, for other reasons, good readers who were not good spellers.

Congenital Defects of Special Cortical Areas.—No evidence was found to substantiate such diagnoses as "congenital word-blindness," "alexia," etc. These concepts have been questioned by several writers.[5] It is usually impossible either to prove or disprove them. If they exist they are very, very rare.

Other concepts such as defects of "visual memory," "auditory memory," "inability to associate auditory and visual symbols," "defects of visual imagery," or defects in "visualization," "special disability," etc., must finally be explained in terms of defect or deficiency of the central nervous system and are not essentially different concepts from "word-blindness." Neither neurologists or psychologists are in agreement even among themselves concerning the validity of these several concepts, and our procedure was to consider them only as a last resort in diagnosis.

DEFECTS OF THE SENSORY MECHANISMS

Serious defects of vision were discovered in four cases. Milder defects were found in three others, and in many cases such defects probably existed uncorrected at the period of learning to read. Serious visual defects are without doubt a complete or at least contributory cause of disability in reading and spelling. The defects of hearing were not so common. One case of inability to discriminate tones differing by less than 35 vibrations per second was found. It is doubtful whether this contributed greatly to difficulty in reading or spelling.

DEFECTS OF MOTOR MECHANISMS

Marked motor sluggishness and incoordination were shown in three cases and to a less pronounced degree in two others.

[5] Hollingworth, L. S., *Psychology of special disability in spelling.* Teachers College Contributions to Education, 1917. Freeman, F. N., "Clinical study as a method in experimental education." *Journal of Applied Psychology,* March, 1920.

These five and several additional cases were found to be defective in writing ability. Although the approximate correlation between writing and spelling or reading was but 0.15, seriously defective writing does produce a handicap in spelling. In one or two cases a general carelessness was probably responsible for both poor writing and poor spelling.

Defective articulation.—According to our appraisal, defective articulation was definitely associated with inferior reading and spelling in one case. The causal connection was indirect, inasmuch as it appeared that habits of hurrying in order to avoid stammering, when the subject encountered difficult words, had led to a variety of inappropriate habits which inhibited the development of effective methods of attack. A similar solution was suggested but less certain in a second case.

Defective eye-muscular control.—Two cases of defective visual perception grew out of defective coordination of the eye-muscles which was not discovered until strabismus developed. One of these subjects was reported by an oculist as suffering from "defective convergence and word-blindness." Following correction and remedial treatment of the muscular defect, these subjects rapidly learned to read and spell as a result of training in word perception and analysis. The former subject improved much more slowly, due in part, probably, to a continued difficulty in control of eye-movements, and in part, to the persistence of certain unfavorable reading habits.

Inappropriate eye-movements.—In cases showing no organic defect, inappropriate eye-movements usually accompany all types of difficulty in reading. It appeared, in the cases here studied, that the inappropriate eye-habits were a secondary but necessary result of difficulty in reading however caused. We were unable to alleviate the difficulty in any case tried by means of training directed to eye-movements alone. On the other hand, the facility with which eye-movements readjusted themselves as the result of improvement in reading achieved by other forms of training was very great.

Inappropriate Eye-Voice Span.—Like inappropriate eye-movements, a limited eye-voice span (inability to look ahead

of the words being silently or audibly articulated) seems to be a symptom or result of other difficulties rather than the cause of them.

UNFAVORABLE BEHAVIOR OF A GENERAL CHARACTER

Disinclination, inertia, etc.—Under this caption a large number of characteristics—sheer laziness, distaste for school or for mental work, emotional disturbance either temporary or chronic, outside interests, home spoiling, etc.—might be considered. Without doubt, some of the backwardness was due to lack of interest and effort, however occasioned. Disinclination was sometimes caused by inability which in turn was due to ineffective methods or native inaptitude. The function was disliked because it was difficult, because little progress attended application, and because of the chagrin of constant failure. When the pupil had acquired effective methods of study and observed that he really could learn, a new and happy interest was the common result. Some of the pupils, for example, began to read books, a thing that had never previously been done because reading was difficult work. Several cases, however, especially in spelling, failed to develop any considerable interest or initiative. To discover the ultimate cause of such disinclination would require a more intimate acquaintance with the life history and heredity of these cases than we were able to secure.

Emotional and Nervous Instability.—That the unstable or neurotic child is frequently retarded in school work, specially in work such as phonetics, spelling, and arithmetic which require persistent drill, has been frequently noted. Two of our cases were of this type. They were hasty and careless, both in learning and in performing during the tests. Their methods of study were neither effective nor consistent; they tired of the work before they were well under way. Add to the neurotic constitution almost any special inadequacy for the work and pronounced backwardness is the usual result.

UNFAVORABLE TRAINING

General psychology teaches us that we learn to perceive words, objects, distance, etc., in much the same manner that we

learn to play the piano, typewrite, or sing. In the case of acquisition of skills, we realize the need and value of instruction. It is equally, perhaps more, needed in learning to perceive words for the reason that the appropriate and inappropriate responses can be detected by the learner only with difficulty. Children left to themselves will seldom discover the economical and effective methods of playing a piano or running a typewriter, and we may expect many to develop very ineffective methods of perceiving words in reading and spelling.

In at least one-third of our cases, lack of training or inappropriate training was responsible, at least in part, for the difficulty in reading and spelling. Some of the common difficulties, caused in whole or in part by inappropriate training or lack of training are: (1) Misrecognition and mispronunciation due to habits of perceiving words vaguely as wholes, or of perceiving certain essential parts vaguely, or of perceiving in some other inappropriate way. (2) Inability or ineffective methods in analyzing and attacking unfamiliar words. (3) Habits of neglecting unfamiliar words accompanied by a search through the material in an effort to comprehend the passage on the basis of such words as are familiar. (4) Mispronunciation of familiar words because of the procedure described in (3). (5) Various types of inappropriate eye-movements because of (1), (2), or (3). (6) Narrow eye-voice span i. e., inability to see ahead of material being pronounced aloud or silently, because of (1), (2), or (3). (7) Super-sufficient reaction to details of words, due to improper training, lack of training, or some other cause. These causes result in a variety of errors, in inability to grasp large units, and often in inability, to recognize long or uncommon words. (8) A variety of unsystematic procedures in word recognition. (9) Failure to comprehend because attention is absorbed in recognition or pronunciation. This occurs among the mechanically good, as well as among the poor oral readers. (10) Over-emphasis of articulatory responses resulting in low speed and various other inadequacies such as expressionless oral reading, rapid slurring reading, tendencies to stammer, nervousness,

etc. These are found in combination with the types of defect listed above. They are sometimes the result of other difficulties, and sometimes causes of disability.

UNFAVORABLE HOME AND SCHOOL TRAINING

Four types of general deficiencies in training were discerned. First, the loss of training at critical periods, as, for example, at the beginning of analytical work, is a very serious matter. In one case, such a loss resulted in the development of unfavorable reactions during the effort to read additional material when the subject rejoined his class. Second, changes from one form of training to another may result in inhibitions or confusions which prevent the formation of effective habits. These may be due to transfer from one school to another, or the confusion which may arise on entering school when a child has been taught to read by the alphabet method at home. Third, early training in a foreign language may be a handicap of some importance occasionally, but certainly not invariably. Fourth, unfavorable home training of inappropriate type or of a different character from that given in school, may contribute to the difficulty. In three cases we have found children deprived of practice because a parent or governess read everything, even school lessons, aloud to the pupil.

REMEDIAL TREATMENT

The types and sources of difficulty in reading and spelling are many, and their intercorrelations so complex that they cannot be adequately unraveled at present. Even when the difficulty is fairly well identified, we are usually very uncertain as to the utlimate cause. No single assumed cause such as speech defect, poor vision, etc., leads to any single type of defect invariably, nor is any type of defect associated invariably with any particular assumed cause.

It is unlikely that all possible types or causes of difficulty in these functions have been encountered among our subjects, and equally unlikely that the numerical distribution of those found would be the same in another group subject to different training and other environmental factors.

TABLE VIII.—THE IMPROVEMENT IN RATE AND COMPREHENSION OF READING

(Figures indicate grade norms attained at stated times)

Comprehension (Thorndike-McCall)					Rate (Courtis, Monroe, Brown)			
Grade	Nov.	Jan.	May	Improvement Grade Years	Nov.	Jan.	May	Improvement
III	2.8	3.7	4.1	1.3	2.5	3.1	4.7	2.2
IV	4.5	5.3	6.2	1.7	3.7	4.5	6.1	2.4
V	5.8	6.4	7.0	1.2	4.7	6.0	7.2	2.5
VI	6.6	7.2	8.0	1.4	5.8	7.2	9.8	4.0
VII	8.1	8.3	9.2	1.1	7.0	9.0	10.0+*	3.0+
VIII	8.2	8.4	10.5	2.3	8.2	9.0	10.0+*	1.9+
Mean				1.5	Mean			2.7+

* Scores were above Grade X norms as estimated.

Space does not permit a description of the remedial treatment administered. Two general forms of training were adopted, one during the course of instruction in reading, another during instruction in spelling. Each was devised to supplement the other. In addition to this instruction, given to all, the backward pupils were given special attention according to their particular difficulties.

Table VIII shows the progress in reading achieved during the year. On the basis of intelligence, we should expect our pupils, according to the Accomplishment Quotient concept, to exceed the average progress by about 16 percent. They exceed it by 50 percent in comprehension, and by about 200 percent in rate of reading. In spelling, Grades III to VI, in which spelling was taught according to the plans developed, the improvement was twice the average, as compared to 40 percent of the average, achieved by Grades VII and VIII. The facts are given in Table IX.

With the exception of one case of spelling, all of the backward pupils improved greatly. We did not, however, succeed in making first rate spellers out of those originally poor. Taking

TABLE IX.—SCORES IN SPELLING TESTS IN TERMS OF PERCENT OF CORRECT SPELLING OF EQUIVALENT LISTS SELECTED FROM AYRES-BUCKINGHAM SCALE

Grade	Score Nov. 1	Score Jan. 15	Score May 15	Improvement[a] in Years
III	21	40	55	1.7
IV	29	52	69	1.8
V	42	63	82	2.2
VI	40	57	70	2.0
VII[b]	61	63	66	0.4
VIII[b]	59	62	64	0.4

[a] Figures in this column are improvements expressed in terms of average improvements achieved by American schools in general (Ayres norms). Grade III-VI used the special method.

[b] Grades VII and VIII had little specific instruction in spelling.

all cases, both good and bad readers and spellers in grade groups, correlations from 0.50 to 0.90 are found between status at the beginning and at the end of the year. That is to say, those good at the start of a period of training, generally speaking, still excel their initially less gifted companions at the end; and in all likelihood they will still show their superiority ten years hence. While we cannot make all children equally efficient readers and spellers, by means of careful diagnosis and specific remedial instruction, we can make most of them better than they otherwise would be and enable some of them to learn who otherwise might not learn at all.

THE EFFICIENCY QUOTIENT AS A MEASURE OF ACHIEVEMENT

T. L. TORGERSON
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Users of standard educational tests are no longer content with measuring the results of instruction in the various grades of a school but are demanding an accurate measurement of the work of each individual pupil. The average or median score of a class when considered alone may be very deceptive of the true conditions within that group as it gives no information with regard to the individuals measured. Every large school system represents relatively unselected groups of individuals ranging in intelligence from the subnormal to the near-genius type. To compare the performance of every pupil in a given test with grade norms may result in conclusions which are highly erroneous and unjust. The slow pupil is underrated and the superior pupil is overrated. Accurate and just measurements of the individual pupil necessitate measuring the performance of each pupil in terms of his own intelligence.

A beginning has been made in this direction by attempting to establish age, as well as grade norms. Buckingham and Monroe in the Illinois Examination have provided age norms. By dividing the achievement age of a pupil in reading by his mental age a measure of his reading ability is secured which is called the achievement quotient. Franzen in the Teachers' College Record of November, 1920, suggests a similar measure which he calls the accomplishment quotient.

A procedure for the measurement of the efficiency[1] of a pupil that allows the use of any standard test with the now available

[1]The writer is aware that this method does not give as accurate results as may be secured with the use of age norms and standard deviations. However, as only a relatively small number of the standard tests have been thus standardized the large majority of our tests are of little value for individual diagnostic purposes. When the method suggested by the writer is used one must keep in mind that the greater the deviation of the age of a given child from the average age of the grade the more unreliable the efficiency quotient becomes. Nevertheless in spite of the limitations of this method the writer is convinced of its practical value as a key to individual instruction.

grade norms is herewith suggested. This method does away with the necessity of any computation as the quotients are quickly obtained by reference to tables.

What relationship exists between grade norms and the intelligence of the pupils tested? The standards for any reliable test are determined by being given to thousands of school children. After the scores for the various grades are compiled the median score for each grade is determined and used as a standard for the grade. This standard median represents the middle-most measure. The distribution of intelligence in this large unselected group forms a bell-shaped curve known as the probability curve or normal curve of distribution. Fifty percent of this group are of average intelligence and the median intelligence of the group represents the pupils with intelligence quotients of approximately 100.

Because of the high correlation between intelligence and scholarship the median point scores used as grade norms in reality represent the scores that have been made by pupils with intelligence quotients of approximately 100. The standard performance of a pupil with an intelligence quotient of 80 should be .8 of the grade norm while that of a pupil with an intelligence quotient of 120 should be 1.2 of the grade norm. Nevertheless, the important thing to be determined is not whether the performance of one pupil is equal to that of another in a given class or of some mythical average, but whether or not a pupil is doing all that he can be expected to do, because of his intelligence or inherent capacity for learning. The standard for each pupil should be an efficiency of 100 percent in terms of his own intelligence.

By dividing a pupil's point score in any test by the grade norm, which is based upon an I. Q. of 100, the performance of the pupil in comparison with the performance of the average pupil is determined. This measure is the pupil's achievement quotient. If the pupil's performance in any test is equal to the grade norm, his achievement quotient is 100. However, if his intelligence quotient is above 100, he is not doing the work that

should be expected of him. In other words he is not 100 percent efficient.

The following data suggest the reliability of using grade standards as norms for pupils of intelligence quotients of 100. These data are taken from results secured by giving the Thorndike-McCall Reading Test to the fourth, fifth, and sixth grades in the West Allis Schools. Out of this group of 730 pupils, there were 120 with intelligence quotients from 96 to 104 inclusive. The medians of both the intelligence quotients and achievement quotients of these pupils were 100. In other words the median scores of the pupils in the fourth, fifth, and sixth grades with intelligence quotients of 100 were exactly the same as the grade norms.

By dividing the achievement quotient by the intelligence quotient a measure of the pupil's efficiency in terms of his own intelligence is determined. This measure is the efficiency quotient. The standard of efficiency for every pupil is 100. If the pupil's intelligence quotient is 110 and his achievement quotient 90, his efficiency quotient is 82.

Table I gives the median quotients of the several sections in spelling in the seventh and eighth grades in the Junior High School. The pupils are classified according to ability. The

TABLE I.—SPELLING. TEACHERS COLLEGE SEVEN S SCALES

Grade	Section	Point Score	Intelligence Quotient	Achievement Quotient	Efficiency Quotient
VII-B	1	48	78	78	100
	2	54	91	85	97
	3	64	104	102	98
	4	74	118	118	100
VII-A	1	54	81	85	105
	2	62	92	98	106
	3	66	110	105	95
VIII-B	1	52	92	72	78
	2	72	94	102	108
	3	70	100	98	98
	4	72	100	102	93
VIII-A	1	58	85	82	96
	2	58	100	82	82
	3	74	116	105	90

intelligence quotient forms the basis for this classification. The data are taken from a total of 330 pupils. Table II gives the median quotients in reading in Grades IV, V, and VI in West Allis.

TABLE II.—THORNDIKE-MCCALL READING TEST

Number of Pupils	Grade	Intelligence Quotient	Achievement Quotient	Efficiency Quotient
136	IV-B	91	98	108
109	A	89	97	109
141	V-B	90	94	104
102	A	97	99	102
149	VI-B	105	98	93
95	A	95	91	96

The situation as it may develop in the case of an entire class is indicated in Table III. This table presents the quotients for the five children in a fifth grade who had the highest intelligence quotients, and for the five children having the lowest intelligence quotients.

TABLE III.—FIFTH GRADE. THORNDIKE-MCCALL READING TEST

Pupils	Intelligence Quotient	Achievement Quotient	Efficiency Quotient
S. T.	140	127.5	93
J. B.	129	142.5	112
T. B.	126	132.5	108
K. B.	123	87.5	72
L. H.	121	132.5	112
L. C.	78	95	119
J. G.	77	87.5	120
O. N.	76	85	113
J. G.	72	80	106
R. I.	71	85	121

From these data it would appear that the slow pupil is more efficient than the superior pupil. Is this not a result of directing classroom instruction to the pupils of average intelligence and using every stimulus and incentive with the slow pupils to raise their standard of work? What has been done for the superior pupil? By putting forth a minimum amount of effort they have been doing as well as, or better than, the average pupil. They have been working under low pressure and have acquired habits

of study and work that represent a low rate of efficiency when compared with their superior intelligence.

By classifying pupils according to intelligence and readjusting the subject matter and methods of instruction to the needs of each group, the work of each pupil can soon be placed on a high plane of efficiency. This may be illustrated by the following example. During the first semester of the school year 1920-1921 the sixth grade in one of the buildings was divided into two sections under separate teachers. The pupils were not classified according to ability. At the beginning of the second semester, however, the pupils of high average intelligence were grouped together under one teacher. Twenty-eight pupils were in this group and the intelligence quotient was 105. Table IV shows the quotients of this group for Monroe's Silent Reading Test. The first two tests were given before the pupils were classified. The last test was given after one semester's work in the classified section.

TABLE IV.—MONROE'S SILENT READING TEST. GRADE VI

Date of Testing	Achievement Quotient	Efficiency Quotient	Increase in Efficiency (percent)
September median	105	100	..
January median	120	114	14
May median	170	162	42

The reader's attention is called to the fact that during the four months that the pupils were unclassified, the increase in efficiency was but 14 percent but that during the four months from January to May—i. e., during the period when those of high average intelligence were grouped together—it rose from 114 to 162 with a percentage increase of 42.

Standard tests are of paramount importance to the classroom teacher as diagnostic instruments revealing the type of remedial instruction to be given. They may prove of inestimable value to the pupils themselves. If the results of the tests are placed before the pupils in a graphic form, it will be an effective means of motivation. An objective method of placing the performance

of the pupils before them for comparison with standard goals will serve as a very wholesome incentive for more efficient work. Figure 1 is a reproduction of one of the graphs used for this purpose in the West Allis Schools. The achievement curves were based upon a list of twenty words taken from the Ayres Scale. Curve A shows the distribution of achievement quotients at the beginning of the semester. Curve B shows the distribution of quotients at the end of the semester. Space is also allowed for subsequent tests to be graphically recorded for comparison with Tests A and B. The median intelligence quotient of the class was 105.

Several general considerations may be mentioned in conclusion, considerations which affect the size of the efficiency quotient. Confining our attention to the conditions in virtue of which the efficiency quotient may rise above 100, we may observe that this result may be brought about in any one of four ways.

First, the original norms for the tests in question may be too low. They may be gathered from school systems where progressive measures and remedial activities have not been taken. To the extent that this is true, the published standards are too low. A pupil's achievement quotient will be represented as too high. Since his efficiency quotient is his achievement quotient divided by his intelligence quotient, there will thus be a fictitiously high representation of efficiency.

Second, due to non-intellectual qualities of a high order, the pupil in question may really be able to do better work than the average pupil of his intelligence. If such is the case, the efficiency quotient becomes a valuable measure of the extent to which these non-intellectual traits are operative.

Third, if dependence is placed upon grade norms for obtaining achievement quotients, a pupil may be represented as highly efficient because he is classified in a grade too low for his ability. Under these circumstances, he naturally scores high in the tests with reference to the standard of the grade to which he belongs. If, however, he were advanced to a higher grade, his performance would not yield as high an efficiency quotient.

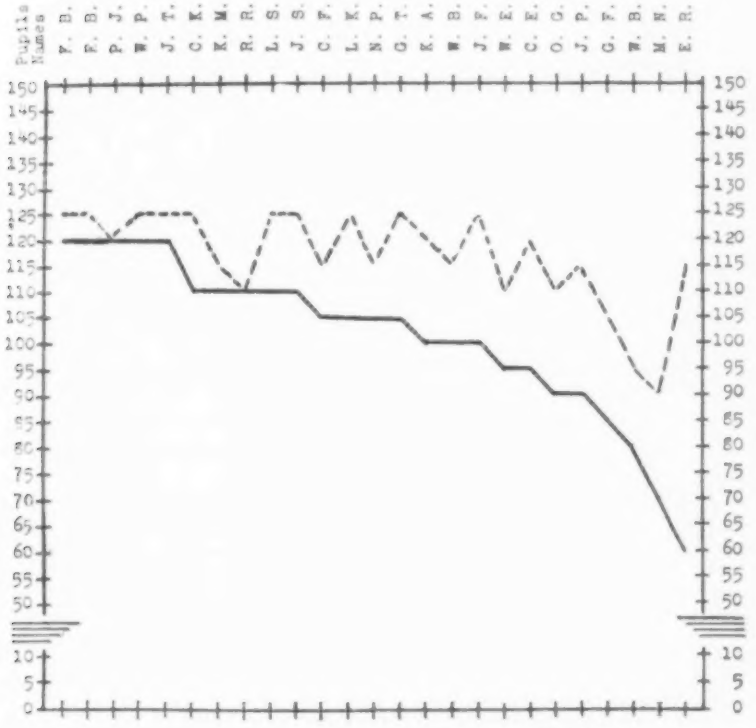
Finally, an efficiency quotient above 100 may be the result of superior instruction or of superior administrative procedure. This is the inference to be drawn from Table IV.

Test I. Curve A. Date, *January, 1921.* { Median Achievement Quotient, *105* / Median Efficiency Quotient, *100*

Test II. Curve B. Date, *May, 1921.* { Median Achievement Quotient, *120* / Median Efficiency Quotient, *115*

. . . . . VI-A Spelling . . . . . .

Building Grade Subject Teacher



(Curve A, full line; Curve B, broken line.)

FIGURE 1.—DIAGNOSTIC ACHIEVEMENT RECORD

Summary

1. Comparing the performance of a pupil with a standard grade norm does not give the proper measure of the pupil's work. Every pupil must be measured in terms of his own intelligence in order to determine his efficiency.

2. Standard grade norms represent the performance of pupils with intelligence quotients of 100.

3. Standard grade norms may be used as standards for the pupils of the given grade with intelligence quotients of 100.

4. A pupil's point score divided by the grade standard gives the achievement quotient which is a measure of the performance of the pupil in comparison with the performance of the average or normal pupil with an intelligence quotient of 100.

5. The achievement quotient divided by the intelligence quotient expresses the efficiency of the pupil in terms of his own intelligence. This measure is the pupil's efficiency quotient.

6. The quotients are found by reference to tables that have been prepared that embrace all standard tests.

7. A pupil's efficiency quotient may be above 100 due to:
   a. Standard norm too low.
   b. Pupil does better work than the average child of his intelligence.
   c. Improper classification of pupil.
   d. Superior instruction.

8. The average slow pupil is working at a higher rate of efficiency than the superior pupil.

9. The performance of the pupils displayed in graphic form will prove a wholesome incentive to the pupils for increased efficiency.

HOW MUCH MENTAL ABILITY DOES A TEACHER NEED?

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The educational air is filled with tests and talk of tests but rarely is there occasion to test the testers. More and more teachers are coming into service almost entirely unmeasured except through the rather formal evaluation of the training-school instructors and the halting and discounted activities of the practice classes. Diplomas and certificates to teach have followed hastily in the wake of weeks checked off on the calendar of training, and we have faced the fact that we had with us a considerable number of young people who stepped forth to teach, casting the shadow of a well-trained teacher without the substance. This leads us to the conclusion, that training schools are not omnipotent, that they cannot make competent teachers out of less than competent human beings, nor open broad professional horizons to those who are left below the rim. It is commonly assumed that the training agency must build upon a certain amount of native ability, a composite of qualities of the heart and mind. It is the purpose of this paper to consider the latter somewhat, though there will be no pretense of a definite answer to the ambitious interrogatory of the title: How much mental ability does a teacher need? A few observations, however, will be offered on the subject.

The gifted individuals do not greatly exceed five percent of our total population (from five to seven percent, according to various estimates). In Ohio we have, therefore, in round numbers, perhaps 300,000 superior men and women. If we assume that the teaching profession draws 5 percent of these, we are undoubtedly liberal in the face of the competition of business and the well established professions. This would give to education not over 15,000 gifted people. Since the entire teaching force of the state is about 35,000 persons, this would leave about 20,000 others to be recruited from the great average class. In fact, if the investigation made at Chillicothe high school last

year is an index to a general situation, we are far too liberal in the above estimate. The average intelligence quotient for the whole senior class was 102; for those who elected teaching it was 98; for those who elected law, medicine, and engineering it was 121. Four or five of the thirteen who expressed a desire to teach were below the average in ability and very unpromising. If the notion has been current in America that the schoolmaster or schoolmistress is an oracle and an outstanding paragon of knowledge and ability, that notion must be let slip in the face of the facts. Nor can we demand that the teacher shall be of superior mental ranking unless we at the same time have a magic carpet that will convey one-eighth of the state's gifted individuals straight to the fields of education. However, we do want to ask for more and more superior individuals and we must also strenuously insist that we shall never go below the group of average ability for any of our recruits.

Teaching requires too large a body of workers to secure only the mentally elect. No other profession in Ohio approaches the size of the teaching profession. The lawyers come closest with approximately 9000 enrolled. Of doctors there are about 6500, of dentists and pharmacists 4500. Here then is a vocation whose workers are four times as numerous as are those engaged in law, and five-and-a-half times as numerous as the doctors. It is beyond reason to hope that we shall soon cease to draw upon average people to fill the ranks of such a tremendous professional army, but we can expect a progressive development in the direction of a steadily increasing proportion of gifted recruits. That is our real hope. The teacher may not be a seer and a prophet nor satisfy Goldsmith's wonder "That one small head could carry all he knew," but she (the gender must be shifted) should be an educable human being of reasonable parts. It must be insisted that her mentality be greater than that of the 300,000 dullards which we possess as an offset to the like number of gifted.

The Department of Education made a survey last year of the students in the county-normal schools of the state through the medium of group intelligence tests. Evidence was wanted regarding the mental power of the entire group—the cerebral

complexion, as it were. It was not found that the group of 743 students measured, ranged from average to superior, as our program calls for, but that they ran the gamut from inferior to gifted. Quite naturally the query was: Is there not a line below which not enough mental ability exists to make the individual at all promising in spite of other desirable qualities? The answer seemed to be in the affirmative. Those who analyze the necessary qualities that go to make up the successful teacher are quite sure that mental ability is only one factor, but they do not deny that when it is present in only very limited extent it negatives and renders abortive any other ordinarily essential qualities. The Department's premise, therefore, has been that success as a teacher may not correspond perfectly to mental ability but that there is a vanishing point where absence of mental alertness will be followed by lack of teaching success.

The Terman Group Test of Mental Ability was administered in 42 county-normal schools last year. The distribution of scores approximated the normal curve, revealing, as pointed out above, that persons of all grades of ability were entering the teaching profession; and there seemed no ground for assuming that any strongly modifying selective process had been at work.

The median score was 141.86. The quartiles were 117 and 162, meaning that half of the students made scores between these two figures. In any large unselected group we should expect sixty percent to be of normal, or average intelligence, so applying this principle to the data secured by these tests, we can say that those who made scores between 112 and 168 are of average mental capacity. It naturally takes some individuals somewhat below the exact median and some above it to produce an average and those at or near 112 have not the power of those at or near 168, but within those confines are found the varying grades of power which characterize the broad plateau of mediocrity.

During the first part of this current school year (1921-22) the same test was again administered in 49 county-normal schools to 1305 pupils. The results show an interesting conformity with last year's data. The median was 141.21 as against 141.86 cited

for last year. The other points on the distribution compare as follows:

	Last Year	This Year
7-Percentile	92	92
20-Percentile	112	112
25-Percentile	117	119
50-Percentile	142	141
75-Percentile	162	162
80-Percentile	168	167

The equivalence of the two distributions was very significant and strengthens faith in the whole program. The 7-percentile, which was 92 both years, has been taken as the vanishing point, referred to before. Students scoring at or below this point have been singled out for elimination from the training schools unless their score on another reliable group test contradicted the Terman score. The seven percent mark was chosen because that point is commonly accepted as cutting off the distinctly questionable portion of any distribution not too highly selected.

The Illinois General Intelligence Test was given to 900 of the same students who took the Terman Test. The data secured with the Illinois scale were as follows:

7-Percentile	87
20-Percentile	101
25-Percentile	104
50-Percentile	119
75-Percentile	133
80-Percentile	137

In some cases the National Intelligence Tests were used, in some the Otis and in others the Army Alpha, the aim always being to have more than one measure of a student.

Out of the 1305 students 55, or slightly over 4 percent, were advised to take up other lines of work rather than continue preparation for teaching. Of the 55 deemed undesirable prospects for teaching 51 took the Terman Test. The median score was 77; the average 75. Thirty-seven took the Illinois with a median score of 79 and an average of 77. The Department has had reports thus far to show that 44 students have withdrawn from county normals in line with our suggestion; 42 of these had taken the Terman Test with a median for the group of 78. Thirteen students were tested with the Stanford-Binet individual examination; the median I. Q. was 80, the average 78.

A comparison was made last year between the students' test scores and their high-school marks. The grades of each student were averaged for the full four years of the high-school course and a correlation obtained between these figures and the test results. The coefficient of correlation was 0.43. This may be considered as a marked correlation but does not establish a very close correspondence between ability as revealed by the test and quality of high-school work.

The foregoing facts are of statistical interest only. They do not throw light on our attempted discussion of how much ability a teacher needs. In the interest of securing certain data on this, a report was asked for from twenty-five county superintendents covering the teaching success of certain designated individuals who graduated from county-normal schools last year. Reports were received from 21 superintendents covering 77 individuals. In selecting those for whom reports as to success were to be given, the method in most cases was to designate the two who had made the highest scores in the normal school of the particular county last year, two or three of those who scored near the median of 142, and the two lowest. On a five-point rating scale these would be rated as to mental ability as 1, 3, and 5 respectively. Superintendents were asked to rate them as to teaching success with the figures 1, 2, 3, 4, 5; it was explained that these figures might be understood as signifying superior, excellent, good, fair, and poor respectively. It happened that the scores of two who were selected on the ground of being highest in their schools were not high enough to deserve the mental rating 1, so 2 was assigned in these cases; one was somewhat above the group who were rated 5, so 4 was assigned as a mental rating in this case.

The rating of the superintendents as to success agrees exactly with the rating as to mental ability in 20 cases out of the 77. This is a percent of 26, and may be taken for practical purposes as a measure of the correlation that exists.

A more compact showing as to the relation between the mental ratings and success in teaching as judged by the superintendents is disclosed by Table I.

The distribution of the 77 selected cases according to mental ability was as follows:

Mental Ability.....	1	2	3	4	5
Number of Cases.....	21	2	32	1	21

The distribution of these same cases according to teaching success was as follows:

Teaching Success.....	1	2	3	4	5
Number of Cases.....	4	24	33	13	3

These figures are on the whole encouraging. They show that the chances are twice as good to have superior or excellent teaching if individuals of superior ability are employed, as when individuals of average ability are employed, and almost four-and-a-half times as good as when individuals of low rank mentally are hired. They show further that there is only one chance in ten of an individual of superior ability doing work that is as low as fair or poor, but there is one chance in four that average individuals will do grades of work this low. Perhaps the most surprising thing about these reports is that 57 percent of those

TABLE I.—RELATION BETWEEN MENTAL RATINGS AND SUCCESS RATINGS

Mental Rating	Rating for Success in Teaching (Percents)		
	"Excellent" or "Superior"	"Good" or higher	"Fair" or "Poor"
5	14[a]	71	29
3	31	75	25
1	61	90	10[b]

[a] None "Superior."
[b] None "Poor."

who were at the bottom of the scale on the tests are doing good work and 14 percent are doing excellent work. None of the low group were rated as doing superior work and, conversely, none at the top of the scale mentally were rated as doing poor teaching.

One point needs to be brought forward here and that is that the results on one mental test are not always conclusive. This year 91 individuals made scores at or below 92 on the Terman Test, but only 51 of these were singled out for elimination because it was found that their showing on the Illinois or some

other second test did not corroborate closely enough the verdict of the first test alone. Hence, only 56 percent of those below the 7-percentile mark on the Terman Test were conclusive cases. This same percent may be assumed to have been valid last year, and that would mean that we are treating in this part of our study some students as 5 in mental ability who might have been found to be at least one notch higher. Applying this percent to the 21 of mental ability 5 treated in this part of the investigation, we should have about 12 students who could be considered incontestably 5. The chances are that with such a correction the success showing of the group would have been more in accord with reasonable expectations. It will be noted that while the Terman median for the group rejected this year was 77, it was 83 for the low group of last year—the group whose success we are studying; the averages were 75 and 81 respectively. Therefore our group for the purposes of this success study was somewhat above the level of those marked this year for elimination.

We might as well understand, however, that we cannot eliminate by these suggested revisions the disquieting fact that a large proportion of those lowest on the test are considered to be doing good work or better. It leads to the belief that either the tests or the ratings or both are wrong. Or if both the tests and the success estimates are dependable, we are led to the conclusion that a teacher does not need to be up to the average in mental ability. That is to say, our hypothesis is wrong; and there is no point below which qualities of address, of temperament, and of volition cannot compensate for lack of intellectual power. Some analysis is in order.

I am inclined to place considerable reliance upon the validity of the Terman Group Test. I recognize the limitations of group tests as absolute measures, but they do succeed in establishing relative degrees of ability to a highly satisfactory extent. I have already allowed for the fact that because this was the only test given last year some students may have been placed lower than a second test would have indicated, and that this may have been true in as much as 44 percent of the cases.

As to the superintendents' ratings I think that even they themselves would agree that there is greater possibility of error here.

The reasons are: (1) that there were 21 different measuring sticks used in these success ratings, all largely subjective, whereas there was only one objective measuring scale used in deriving the mental ratings; (2) that the item which I asked to be rated—"success as a teacher"—was so general and undefined as to invite a lump estimate, with some factors inevitably getting different weights with different people; (3) that I allowed so little time for reply that there was no opportunity to base the estimate upon a very extensive observation. For instance, a girl who was tested last year with the Stanford-Binet individual examination showed a mental age of 11 years and 5 months; the superintendent says her success is good. A girl who scored 67 on the Terman Test, and who was rated by the normal director last year as being 4 in general ability and 3½ in classroom work, is rated by the superintendent as 2 in teaching success. Another scored 91, was rated by the normal director 4½ in general ability, 4 in classroom work but 2 in success by the superintendent. These success ratings seem open to further investigation. There is a common human tendency, manifested by both directors and superintendents, to rate too high. For example, in rating the students in the normal schools last year the directors placed almost twice as many students too high as too low, if we use the test scores as a standard of reference. As far as the superintendents' high ratings are concerned, it may doubtless be said—and the statement really constitutes a tribute to the county normal schools—that the superintendents quite uniformly find this training making itself effectively felt and that even the weaker individuals stand out reasonably well when occasional sections of their work are seen in the early part of the year.

Since there is the possibility of errors both in the testing and in the superintendents' judgments and since the group studied is very small, we cannot hope to draw any very definite conclusions. An adequate comparison could only come through having one individual rate the whole group with very definite standards in mind as to what constitutes teaching success.

It is a rather common belief, to which I have subscribed, that the primary teacher does not need to have as much mental ability as teachers of other grades. Accordingly, normal directors and

superintendents have at times suggested keeping in school those students who make low test scores and placing them in primary work. The only way to answer that question would be to measure a large number of primary teachers and see if the majority of those considered satisfactory were below average mentally. During Camp Sherman days Prof. C. A. Murchison administered the army test to the teachers of a certain city. It was found that the level of ability of the first-grades teachers was lower than that of any other group of grade teachers, but it was not found that any of them was below average. Seventy-six teachers were examined: 69.6 percent (an unusually high proportion) were rated very superior; 21 percent were superior, 7.8 percent were high average, and 1.3 percent were average. So while it is likely that the keenest and quickest mentalities are not often accompanied by those qualities of patience and sympathetic appreciation of halting efforts that function so well in primary work, it is unfair to assume that we must go below average ability to get good primary teachers, or even that adequate primary teaching can be achieved by individuals as low on the scale of relative ability as are those we have sought to eliminate this year.

Can we afford to develop our educational workers out of anything but good materials or can we develop the progressive, growing type otherwise? In an age which demands mental keenness and alertness for success in any important calling we cannot afford to demean the teaching profession by demanding anything less. It is apparent from this study that our best prospects for success are to be found in individuals of above-average mental ability. Therefore, while keeping in mind that we cannot find enough superior people to fill the profession, we can constantly strive to get more and more of this better type. We need not gainsay the merit of the teacher of average ability who possesses to a marked degree many wonderful qualities that enter into the successful teacher's make-up. But we are sure to be wrong if we minimize mental ability, if we expect other qualities to offset its lack, and if we do not stand for the application of some selective process by teacher-training institutions. This limited investigation shows that you can expect teaching success to keep reasonable pace with mental ability.

COMPARISON OF THE BINET-SIMON AND OTIS TESTS

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The purpose of this article is to make a comparative study of results secured by giving the Stanford Revision of the Binet-Simon Test and the Otis Advanced Group Intelligence Test to 158 pupils of the Peabody Demonstration School.

The Peabody Demonstration School is conducted in connection with George Peabody College for Teachers. Several contributing factors give this school a somewhat selected enrollment. A rather large tuition fee is charged; therefore most of the children come from the homes of the business and professional classes. Pupils who are unable to do the work of the grades successfully, either because of poor ability or because they cannot be induced to make further earnest effort, are asked to withdraw from the school. A further selective measure is the fact that during the last two years pupils who have been admitted to the school have been required to take a psychological examination. If their ability has been found to be poor, they have not been allowed to enter.

During the months of February and March, 1921, all the children (158) of the fourth, fifth, sixth, seventh, and eighth grades of the Peabody Demonstration School were given the Stanford Revision of the Binet-Simon Test. One month later the same children were given Form A of the Otis Advanced Group Intelligence Test. The tests were given by the professor of educational psychology in George Peabody College for Teachers or, under his direction, by graduate students in the department of educational psychology. In administering the tests, the directions were followed minutely and the scores were carefully checked. Many of the children have taken the Binet-Simon Test two or more times and their successive records have been found to agree in a surprising manner.

Table I gives the distribution of the pupils according to actual ages, Binet-Simon Ages, and Otis Mental Ages. The ages have been tabulated so that 9 years means from 9 years to 9 years and 6 months. The median actual age for the 158 children was 11 years and 10 months. The median Binet-Simon Mental Age was 12 years and 4 months. The median Otis Mental Age was 14 years and 1 month. Thus the Binet-Simon Test gives a median I. Q. of 104; the Otis Test gives a median I. Q. of 118.

TABLE I.—DISTRIBUTION OF PUPILS ACCORDING TO ACTUAL AGE, BINET-SIMON MENTAL AGE, AND OTIS MENTAL AGE

Years	Frequency Actual Ages	Frequency Binet-Simon Mental Ages	Frequency Otis Mental Ages
8	0	0	4
8	0	0	0
8½	0	5	6
9	10	1	2
9½	6	1	4
10	16	9	10
10½	16	13	5
11	17	25	3
11½	15	11	8
12	16	18	19
12½	18	6	8
13	18	10	9
13½	15	7	7
14	6	8	16
14½	5	5	3
15	0	11	11
15½	0	6	7
16	0	7	1
16½	0	7	1
17	0	3	4
17½	0	2	2
18	0	3	38
Median	11 yrs. 10 mo.	12 yrs. 4 mo.	14 yrs. 1 mo.

The median Actual Age, the Binet-Simon Mental Age, the Otis Mental Age, and the difference in months between the Binet-Simon and Otis results for the different age groups are shown in Table II. An examination of the table shows that for every age group the Binet-Simon median is smaller than the Otis median. The difference between the medians for the 9- and 10-year groups is rather small; the Otis medians being two and

six months respectively greater than the Binet-Simon medians. When we examine the 11-year group, however, and the other groups in the table, we find rather large differences: 11 months for the 11-year group, 20 months for the 12-year group, 30 months for the 13-year group, and 28 months for the 14-year group.

TABLE II.—MEDIAN AGES FOR EACH OF THE YEAR GROUPS

Year Group	Cases	Median Actual Age	Median Binet-Simon Mental Age	Median Otis Mental Age	Difference Between B-S and Otis (Months)
9	16	9-6	10-9	10-11	2
10	32	10-6	11-4	11-10	6
11	32	11-5	11-9	12- 8	11
12	34	12-5	13-3	14-11	20
13	33	13-5	15-2	17- 8	30
14	11	14-4	15-4	17- 8	28

Table III shows for each grade the highest, median, and lowest mental ages for both the Stanford Revision and the Otis Test. The table shows considerable variability with respect to these age limits. The highest and lowest Binet-Simon mental ages for each grade are with one exception (Grade V) closer together than the highest and lowest Otis mental ages.

TABLE III.—THE MEDIAN, HIGHEST, AND LOWEST OF THE BINET-SIMON AND THE OTIS MENTAL AGES BY GRADES

Grade	Cases	Binet-Simon Mental Age			Otis Mental Age		
		Median	Highest	Lowest	Median	Highest	Lowest
IV	35	10- 9	12-9	8- 8	10- 5	16-2	8-
V	33	11- 9	18+	9- 5	13- 4	18+	9-9
VI	34	12- 4	17-9	10- 4	14- 3	18+	10-3
VII	27	14-10	18+	11- 7	15-10	18+	12-7
VIII	29	15-11	18+	10-11	18+	18+	9-9

The tables presented thus far show considerable differences between the results secured by the two tests. This is further shown by Tables IV and V.

Table IV shows, for the actual age groups, the frequency of difference in months between the mental ages given by the Binet-

Simon Test and the Otis Test. The differences are grouped in steps of six months. For example, five pupils of the 9-year actual age group when examined by the two tests were given mental ages varying less than six months, while two were given mental ages varying more than six months but less than twelve months.

TABLE IV.—DISTRIBUTION OF DIFFERENCES BETWEEN BINET-SIMON AND OTIS MENTAL AGES FOR EACH AGE GROUP

Difference in Months	Actual Age Groups						Totals
	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	
0– 6	5	6	7	7	5	1	31
–12	2	10	7	5	6	1	31
–18	3	1	5	4	7	3	23
–24	1	6	2	1	3	4	17
–30	1	3	5	3	2	1	15
–36	1	1	4	5	3	1	15
–42	2	2	1	2	2	0	9
–48	0	0	0	1	1	0	2
–54	0	2	0	1	3	0	6
–60	0	1	0	2	1	0	4
–66	0	0	0	1	0	0	1
–72	0	0	1	1	0	0	2
–78	0	0	0	1	0	0	1
–84	1	0	0	0	0	0	1
Cases.....	16	32	32	34	33	11	158

The average difference in months between the mental ages given by the two tests and also the average plus difference in favor of the Otis test for the actual age groups is shown in Table V. There is an average plus difference in favor of the Otis test of more than a year for each of the age groups while

TABLE V.—AVERAGE DIFFERENCES BETWEEN BINET-SIMON AND OTIS MENTAL AGES

Age Group	Average Difference in Months	Average Plus Difference in Favor of Otis
9	19.4	14.3
10	19.4	13.6
11	18.7	13
12	26	24.7
13	22.7	20.7
14	20	15
All	21.5	17.5

there is an average difference between the two tests of more than one and one-half years.

The average difference in months for any age in Table V was found by getting the sum of all differences between the Binet-Simon result and the Otis result for the cases in the age group, and then dividing the sum by the number of cases. The average plus difference in favor of the Otis Test was found by dividing the difference between the sum of the plus differences for any actual age group and the sum of the minus differences for that age group by the number of cases in that age group.

It so happened that a survey of the school by means of educational tests was made a few weeks before the mental tests were given. The following tests were used: the Woody-McCall Fundamentals in Arithmetic Test, the Monroe Reasoning Test in Arithmetic, the Ayres Spelling Scale, the Thorndike Handwriting Scale, the Hillegas Composition Scale, and the Monroe Silent Reading Test. The pupils in each grade were ranked from best to poorest for each test. A composite ranking was made from these ranks by adding all the ranks which each pupil attained and re-ranking these sums from smallest to greatest.

The teachers of each grade were also asked to rank their pupils from best to poorest. They were directed to base their ranking not on school work alone but on general ability as displayed by the pupils on the playground and in the home, as well as in school.

After these rankings were made, coefficients of correlation (rank order method) were worked out for each grade as shown in Table VI. In four of the five grades the Otis Test correlates higher with the teachers' ranking than does the Binet-Simon Test. The Otis Test correlates much higher with the ranking given by the educational tests than does the Binet-Simon Test. The teachers' ranking and educational test ranking give a much higher coefficient of correlation than do either of the mental tests with one of these rankings. When the Binet-Simon and Otis results are correlated we secure rather lower correlations than would be anticipated. However, when the entire 158 cases are correlated

TABLE VI.—COEFFICIENTS OF CORRELATION BETWEEN THE BINET-SIMON TEST, THE OTIS ADVANCED TEST, THE TEACHERS' RANKING, AND THE EDUCATIONAL TESTS RANKING

Grade	Cases	Rankings by	Binet-Simon Stanford Revision	Otis Advanced Group	Teachers' Ranking	Educational Tests Ranking
IV	35	Binet-Simon, Stanford Revision		54	67	62
		Otis Advanced Group	54		74	78
		Teachers' Ranking	67	74		62
		Educational Tests Ranking	62	78	62	
V	33	Binet-Simon, Stanford Revision		57	45	43
		Otis Advanced Group	57		61	73
		Teachers' Ranking	45	61		84
		Educational Tests Ranking	43	73	84	
VI	34	Binet-Simon, Stanford Revision		54	54	33
		Otis Advanced Group	54		83	62
		Teachers' Ranking	54	83		71
		Educational Tests Ranking	33	62	71	
VII	27	Binet-Simon, Stanford Revision		23	38	27
		Otis Advanced Group	23		25	59
		Teachers' Ranking	38	25		74
		Educational Tests Ranking	27	59	74	
VIII	29	Binet-Simon, Stanford Revision		53	54	32
		Otis Advanced Group	53		67	54
		Teachers' Ranking	54	67		69
		Educational Tests Ranking	32	54	69	
Averages		Binet-Simon, Stanford Revision		48	52	39
		Otis Advanced Group	48		62	65
		Teachers' Ranking	45	61		84
		Educational Tests Ranking	43	73	84	

without regard to grade, a coefficient of correlation of 75 between the Otis Test and the Binet-Simon Test is found.

Although the number of cases included in this study is too small to permit any very general conclusions, several things seem to be clearly indicated:

(1) Mental Ages secured by means of the Binet-Simon Test and the Otis Advanced Group Test cannot be used interchangeably.

(2) The Otis Test tends to scatter the scores more than the Binet-Simon Test.

(3) The Otis Test tends to give a higher mental age than the Binet-Simon Test.

(4) The Otis Test and the Binet-Simon Test give a fairly high coefficient. (0.75, n = 158, Grades IV-VIII.)

(5) The Otis Test correlates higher with educational test rankings and teachers' rankings than the Binet-Simon Test.

A DATA SHEET FOR THE PEARSON CORRELATION COEFFICIENT

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I shall describe a data sheet which facilitates the calculation of the Pearson correlation coefficient. If one does not calculate the correlation coefficient often one may find it necessary to return to the textbooks in order to relearn the method of computation. That should not be necessary if a data sheet is available with direct instructions for the computation separated from the discussion of the logic of the correlation table. I find that even those who calculate these coefficients frequently spread their calculations over many slips of paper and compute the various parts in more or less random order. It is almost impossible to check calculations that are not systematically arranged. When I encounter calculations that have been made without a plan and without orderly arrangement I find it difficult to consult them. It is not uncommon to find correlation calculations which are not even labeled as to what the variables are. Such calculations are just as good as if they had been lost or misfiled.

The correlation data sheet which I have been using is of double letter size so that it can be folded once and filed with letter size paper and reports. I have arranged the sheet so that it should not be necessary to do any scribbling on loose slips of paper. A small space is provided for the scribbling that may be necessary. All items in the calculation, such as frequencies at the intersections of the arrays, sums, squares, and other numbers, belong in definite squares on the data sheet. If one has occasion to return to the calculations, one can readily find what one is looking for. The preparation of this sheet is not a contribution to statistical theory. It is merely a labor saving office device.

Instructions for the Use of the Data Sheet

In order to make these instructions brief and easily read I have indicated several of the columns by the numbers at the top

of the sheet. These numbers do not occur on the regular data sheet. They are inserted here for the purpose of these instructions only. The horizontal rows are labeled by letters for the same purpose. The rows and columns are known collectively as arrays. When I refer in these instructions to a certain square on the data sheet I shall refer to it by the number of the column and the letter of the row which intersect at the square to which I wish to call your attention. Thus C-3 refers to a square on the sample data sheet which contains the figure 7. The sample set of data is drawn from West's Textbook in Statistics.[1]

(1) Select any suitable class interval for the X-variable. On the data sheet these intervals are unity.

(2) Record these class intervals in row A as shown (61, 62, etc.) Always arrange the small numbers to the left, and the large numbers to the right.

(3) Row B should contain the upper class limits for the class intervals, which in the case of the example would be 61.9, 62.9, etc. Row A contains, then, the lower class limit, and row B the upper class limit.

(4) Select a suitable class interval for the Y-variable. In the example this is five. Record the lower and upper class limits for these class intervals in columns 1 and 2 respectively. By tabulating both the upper and the lower class limits for each class interval one is sure that the actual range for each class interval is indicated on the data sheet. This serves to prevent confusion as to the square in which any particular frequency is to be recorded. Arrange the small numbers at the bottom and the large numbers at the top as shown.

(5) Record the frequencies in the squares of the correlation table. In the example these range between rows D and K and between columns 3 and 7.

(6) Record in row L the sums of the frequencies in the vertical columns of the correlation table.

(7) Record in column 8 the sums of the frequencies in the rows of the correlation table.

[1] West, Carl J. *Introduction to mathematical statistics.* Columbus, Ohio: R. G. Adams and Company, 1918. Page 67.

(8) Add the numbers in the row L and record at N (N =) in the table of sums in the upper right hand corner of the data sheet. In the example this sum is 750. This is the total number of cases.

(9) Add the numbers in columns 8 and see if the sum agrees with the N just recorded in the table of sums. It should be the same number.

(10) Select any class interval as an arbitrary origin for the X-variable. In the example this is chosen at column 5. This arbitrary origin may be taken at any class interval but it reduces the arithmetical labor to choose it as close to the median as possible. This should be done by inspection because it does not pay to calculate the median specially for this purpose. Draw a blue pencil line or a wavy pencil line through the column 5 so as to mark off clearly at all parts of the correlation table the position of the arbitrary origin.

(11) Do likewise for the Y-variable. The arbitrary origin for the Y-variable has been chosen at row G. This row is marked similarly to the corresponding class interval in X (column 5). The correlation table is now divided by the blue pencil lines into four quadrants. It should be remembered that these quadrants are marked off from the two assumed means and are not to be confused with the quadrants which would be marked off from the true means. No confusion will result unless one should attempt to calculate the coefficient by the method of unlike signs by means of the assumed quadrants.

(12) Record a zero at M-5. Record the successive class intervals on each side of this zero as shown in the rest of row M. Do likewise in row C.

(13) Record in row N the products fx. These are merely the products of the two rows immediately above N.

(14) Record in row P the products fx^2. These are the products of the two rows immediately above P. This is easily verified by inspecting the sample data sheet.

(15) Record a zero at G-9. Record above and below this the ascending and descending orders of class intervals as shown in the rest of column 9.

(16) Record the products fy in column 10. These are the products of the two columns immediately to the left of column 10.

(17) Record the products fy^2 in column 11. The details of these calculations should be evident from the data sheet.

(18) In row D you will find the numbers 3, 2, 2, 1 to the right of the assumed origin. Immediately above these numbers in row C you will find the numbers 1, 2, 3, 4. Each of the numbers in row D is to be multiplied by the number immediately above it in row C. These numbers are to be summed up thus:

$$(3 \times 1) + (2 \times 2) + (2 \times 3) + (1 \times 4) = 17.$$

The number 17 is recorded at D-13. The sums that are obtained on the right hand side of the assumed origin (column 5) are recorded in column 13. The sums similarly obtained on the left hand side of the origin are recorded in column 12. This verbal statement will be clearer by noting visually on the data sheet the manner of the calculation.

This operation is repeated for each row with a separate sum for the right hand side and for the left hand side. For example: In row F we have the following sums.

Left side: $(3\times1)+(2\times2)+(2\times3)=13$
Right side: $(10\times1)+(12\times2)+(11\times3)+(1\times5)+(1\times6)=78$
These sums, 13 and 78, are recorded in the squares F-12 and F-13 respectively.

This operation can be performed with less effort on a comptometer or any other key driven calculating machine. It is done as follows:

Consider the left side of row F. Set the finger on the 1-key at the lower right end of the machine. This key represents the deviation 1 of the C-row. Punch the key three times to represent the frequency of three. Move the finger to key 2 immediately above your present location on the machine. Punch it twice to represent the frequency of two. Move the finger up one step again and punch the new key twice to represent the third frequency of two. The sum of 13 is now on the machine without any further mental effort. This work can be done without look-

ing at the machine so that one may keep one's eyes on the correlation table.

Now consider the right side of row F. Place the finger on the 1-key at the lower right end of the machine. This key may be punched ten times or the key to its left may be punched once to represent the frequency of ten. Move the finger up one step on the machine. Punch this key twelve times or punch it twice and the key to its left once to represent the frequency of twelve. Move the finger up one step on the machine and punch the key eleven times or punch it once and the key to its left once. Move the finger up two steps on the machine and punch once; move the finger up once more and punch once. The sum of 78 is now in the machine and may be recorded at F-13. One will readily learn to move the finger one step at a time on the machine without looking at it even though one may not know more about the calculating machine. In this way the task is rendered extremely easy even for a novice.

(19) The difference between the two numbers 13 and 78 which were recorded at F-12 and at F-13 is 65. This number 65, is recorded at F-15. The same operation is carried out for all the figures in columns 12 and 13. Their differences are recorded in columns 14 and 15. If the number in the 12-column is larger than the adjacent number in the 13-column one records the difference in the 14-column. Similarly, if the number in the 13-column is larger than the adjacent number in the 12-column one records the difference in column 15. One should visualize this right and left relation in order to remember it.

(20) For the portion of the table above the assumed origin of the Y-variable (row G) record the products of the corresponding numbers in columns 9 and 14 in column 16. Record the products of the corresponding numbers in columns 9 and 15 in column 17. These instructions apply above the assumed origin. Below the assumed origin the relation is reversed so that the products 9 and 14 are recorded in column 17 while the products 9 and 15 are recorded in 16. The following summary will make matters clearer.

	Columns
Above the assumed origin:	(9)×(14)=(16)
	(9)×(15)=(17)
Below the assumed origin:	(9)×(15)=(16)
	(9)×(14)=(17)

Another way to recall this is to note that columns 14 and 15 preserve the same spatial arrangement above the assumed origin but that below the origin this lateral arrangement is reversed.

Still another and perhaps the best way to recall this is to note that the y-deviations in column 9 are positive above the assumed origin and negative below the assumed origin. This comes about from the fact that we plot the Y-variable in column 1 with the high numbers at the top of the column and the small numbers at the bottom. If now the positive y-deviations in column 9 are multiplied by positive Σx in column 15 we obtain a positive Σxy and record the product in column 17. If we multiply the negative y-deviations of column 9 by the positive Σx in column 15 we obtain a negative Σxy and record the product in column 16. If we multiply the positive y-deviations of column 9 by the negative Σx in column 14 we obtain a negative Σxy which we record in column 16. If we multiply the negative y-deviations of column 9 by the negative Σx in column 14, the product Σxy is positive and is recorded in column 17.

(21) We are now ready to extract the sums for the final computation of the coefficient. Add the numbers to the left of the assumed origin in row N. Record the sum at $\Sigma x_{neg}=$ in the table of sums in the upper right hand corner. It is 744.

(22) Add the numbers to the right of the assumed origin in row N. Record the sum at $\Sigma x_{pos}=$ in the table. It is 669.

(23) Determine the difference between Σx_{pos} and Σx_{neg} and record this difference at $\Sigma x=$ in the table of sums. It is —75. The relation is $\Sigma x = \Sigma x_{pos} - \Sigma x_{neg}$. Record the proper sign for the Σx.

(24) Add the numbers in the row P on both sides of the assumed origin. Record this at $\Sigma x^2 =$ in the table (4201).

(25) Add the numbers above the assumed origin in column 10 and record the sum at $\Sigma y_{pos}=$ in the table of sums (880).

(26) Add the numbers below the assumed origin in column 10 and record the sum at $\Sigma y_{neg}=$ in the table of sums (933).

(27) Determine the difference between Σy_{pos} and Σy_{neg} and record the difference at $\Sigma y=$ in the table of sums (—53). The relation is $\Sigma y = \Sigma y_{pos} - \Sigma y_{neg}$. Record the proper sign for the Σy.

(28) Add all the numbers in column 11. Record this sum at $\Sigma y^2=$ in the table of sums (7377).

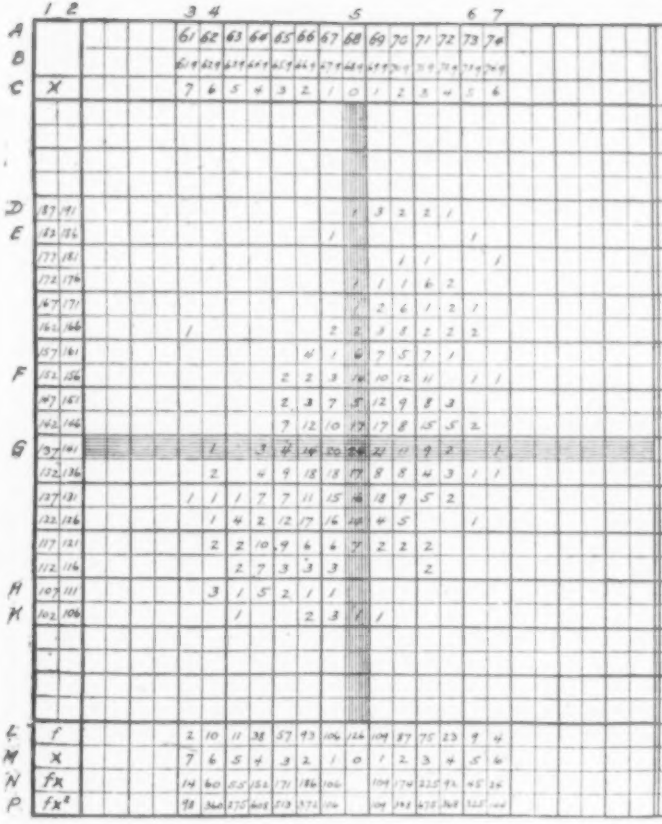
(29) Add all the numbers in column 16 and record at $\Sigma xy_{neg}=$ in the table of sums (zero).

(30) Add all the numbers in column 17 and record at $\Sigma xy_{pos}=$ in the table of sums (2783).

(31) Determine the difference between the Σxy_{pos} and the Σxy_{neg} and record the difference at $\Sigma xy=$ in the table of sums (+2783). The relation is $\Sigma xy = \Sigma xy_{pos} - \Sigma xy_{neg}$. Record the proper sign for the Σxy.

The numbers that have been recorded in the table of sums may be used for substitution directly into the formulae that are printed on the data sheet. From this point on one proceeds as shown by the formulae, turning the crank algebraically as it were, until the coefficient is obtained. In the example the correlation coefficient is +.50.

The work of tabulating the correlation table and computing the coefficient for a problem like the one in the accompanying example requires about forty to sixty minutes after one becomes accustomed to the sheet. If one is working with correlation coefficients continually, the calculation can be made in less time. Verbal description of spatial relations is necessarily clumsy. To read these instructions without consulting the data sheet might give one the impression that these calculations are awkward and even intricate; but after one has translated the necessarily clumsy verbal description into visual or graphic terms, the work can be done by a clerk who knows nothing about correlation statistics.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A			61	62	63	64	65	66	67	68	69	70	71	72	73	74	
B			61-9	62-9	63-9	64-9	65-9	66-9	67-9	68-9	69-9	70-9	71-9	72-9	73-9	74-9	
C	X		7	6	5	4	3	2	1	0	1	2	3	4	5	6	
D	187	191								1	3	2	2	1			
E	182	186								1					1		
	177	181										1	1			1	
	172	176								1	1	1	6	2			
	167	171								1	2	6	1	2	1		
	162	166		1					2	2	3	1	2	2	2		
	157	161						6	1	6	7	5	7	1			
F	152	156					2	2	3	14	10	12	11		1	1	
	147	151					2	3	7	5	12	9	8	3			
	142	146					7	12	10	17	17	8	15	5	2		
G	137	141		1		3	4	14	20	26	21	11	9	2		1	
	132	136		2		4	9	18	18	17	8	8	4	3	1	1	
	127	131	1	1	1	7	7	11	15	16	18	9	5	2			
	122	126		1	4	2	12	17	16	20	4	5			1		
	117	121		2	2	10	9	6	6	7	2	2	2				
	112	116			2	7	3	3	3				2				
H	107	111		3	1	5	2	1	1								
K	102	106			1			2	3	1	1						
L	f		2	10	11	38	57	93	106	124	104	87	75	23	9	4	
M	X		7	6	5	4	3	2	1	0	1	2	3	4	5	6	
N	fx		14	60	55	152	171	186	106		104	174	225	92	45	24	
P	fx^2		98	360	275	608	513	372	106		104	348	675	368	225	144	

f	y	fy	fy^2	Σx −	Σx +	$\Sigma x'$ −	$\Sigma x'$ +	Σxy −	Σxy +
9	10	90	900		17		17		170
2	9	18	162	1	5		4		36
3	8	24	192		11		11		88
11	7	77	539		28		28		203
13	6	78	468		30		30		180
22	5	110	550	9	43		34		170
31	4	124	496	9	62		33		132
56	3	168	504	13	78		41		195
49	2	98	196	19	66		47		94
93	1	93	93	55	108		53		53
110	0								
93	1	93	93	109	59	50			50
93	2	186	372	104	59	45			90
76	3	228	684	120	19	101			303
48	4	192	768	107	12	95			380
20	5	100	500	56	6	50			250
13	6	78	468	52		52			312
8	7	56	392	12	1	11			77

$\Sigma x_{pos} = 669$ $\Sigma y_{pos} = 880$ $\Sigma xy_{pos} = 2783$

$\Sigma x_{neg} = 744$ $\Sigma y_{neg} = 933$ $\Sigma xy_{neg} = 0$

$\Sigma x = -75$ $\Sigma y = -53$ $\Sigma xy = +2783$

$\Sigma x^2 = 4201$ $\Sigma y^2 = 7377$ $N = 750$

$d_x = \frac{\Sigma x}{N} = \frac{-75}{750}$ $d_x = -.10$ $d_x^2 = .01$

$d_y = \frac{\Sigma y}{N} = \frac{-53}{750}$ $d_y = -.071$ $d_y^2 = .005$

$\sigma_x^2 = \frac{\Sigma x^2}{N} - d_x^2$

$= \frac{4201}{750} - .01$

$= 5.60 - .01 = 5.59$

$\sigma_x = 2.36$

$\sigma_y^2 = \frac{\Sigma y^2}{N} - d_y^2$

$= \frac{7377}{750} - .005$

$= 9.835 - .005 = 9.83$

$\sigma_y = 3.14$

$$r = \frac{\Sigma xy/N - d_x d_y}{\sigma_x \sigma_y}$$

$$= \frac{2783/750 - (-.10 \times -.07)}{2.36 \times 3.14}$$

$$= \frac{3.71 - .007}{2.36 \times 3.14}$$

$r = +.50$

Comments:

X-variable Height in inches

Y-variable Weight in pounds

Subjects Students at Ohio State University

Computer L. Date January 17, 1932

CORRELATION DATA SHEET

L.L. Thurstone
Division of Psychology
Carnegie Institute of Technology
Pittsburgh, Pa

Form 1932

Editorials

THE PSYCHOLOGICAL DETERMINIST; OR DEMOCRACY AND THE I. Q.

At the recent convention of school superintendents at Chicago Dr. Bagley hurled another of those effective oratorical bombshells for which he is so justly famous. This one, like most of those which have preceded it in recent years, was an attack against certain educational trends which Dr. Bagley regards as inimical to the fundamental purpose of education as an instrument of democracy. This time, however, instead of repeating his customary frontal attack upon vocational education, Dr. Bagley executes a spectacular flank movement on intelligence testing, a development which he looks upon as an abetting ally of specialized training and as a challenge to those who believe in providing a liberal education for all the children of all the people.

The writer did not have the good fortune to hear Dr. Bagley's able address. He has only read it.[1] From an examination of the cold print he has not been able to see the justness of Dr. Bagley's position, though he would not regard it as strange if many who heard the address were convinced by its eloquence and clearly evident sincerity.

The keynote of Dr. Bagley's argument is that the psychologists who are promoting the intelligence testing movement are fatalists; that they exaggerate the factor of native endowment; that they are more interested in labeling stupidity than in curing it; that their doctrines lead inevitably to the neglect of average and inferior children and to an undemocratic emphasis on training the gifted; that their results are an excuse for limiting the

[1] Bagley, William C., "Educational determinism; or democracy and the I. Q." *School and Society*, 15: 373, April 8, 1922.

education of the masses to narrow vocationalized courses; that the entire movement, founded upon little but psychological fallacies is subversive of American ideals of democracy.

The thing that seems to be especially repugnant to Dr. Bagley is the idea of predicting a child's development or drawing any conclusions regarding his native limitations from intelligence test data. He apparently prefers to base education upon a sublime faith that anything is possible for any child and that processes alone count. He seems to derive satisfaction from the fact that child nature contains so many unknown quantities. He would prefer to believe in "miracles" rather than search for the order and sequence which would make prediction possible. By implication he seems to deny any possibility of a science of education, for of course the essence of science is that it enables us to predict. If he is correct, then the educator is forever doomed to grope in darkness; there can be no light without the possibility of forecasting with some degree of assurance the limits of effect producible upon a given child by given educational processes.

Does Dr. Bagley really believe that native differences in intellectual endowment are mythical and that the product of the school can and should be made uniform? He is careful not to say that he believes this, but except in a single paragraph the implications of his address suggest that if he accepts inborn individual differences at all he regards them as of little if any significance. He feels that to acknowledge such differences would necessitate the abandonment of the democratic ideal, as he conceives this ideal. Therefore they are non-existent, or practically so. Thus we have a new and interesting application of Christian Science Psychology.

In the exceptional paragraph referred to, Dr. Bagley essays one timid glance at reality, but refuses to acknowledge the consequences of what he has seen. "Grant differences in native mentality? Certainly, such differences are inevitable." But almost immediately his vision is blurred by the moist tears of sentiment and the eloquent address closes with a rhapsodic peroration on the miracles that skillful teachers work with morons and on the

ultimate illumination of the world by gleams of light struck from dull minds.

In another section of his address Dr. Bagley, referring to the supposed limits which native capacity places upon development, makes a great deal of the distinction between two kinds of mental growth,—the vertical and the horizontal. Vertical growth is improvement in the ability to perform more and more difficult types of intellectual operations. Horizontal growth is increase of one's repertoire of performances on a given intellectual level. Dr. Bagley admits that vertical growth has its (predetermined?) limits, but thinks he has won his argument by showing that the possibilities of horizontal growth are limitless. In making this admission Dr. Bagley has given away his whole case. Presumably he is not aware of the fact that this very distinction was drawn by Binet fifteen years ago and that it has been especially insisted upon by all psychologists in the field of individual differences. In reality it is one of the main arguments in favor of a differentiated curriculum. The differentiated curriculum allows all the vertical growth of which a particular child is capable and follows this with specialized training along horizontal lines. But hardly has the author admitted the limitations of vertical growth when, as if realizing that he had admitted too much, he retracts and argues that the common man in his daily business constantly grows in power to deal with abstract problems. "I assert most emphatically that he does."

Surely it is not necessary to remind the reader that assertions, however emphatic, do not constitute scientific evidence. The army mental tests give a good deal of opportunity for a subject to show how much vertical growth he has attained in ability to deal with the abstract, but careful analysis of army test results yielded no evidence whatever that any such vertical growth occurs between the ages of 21 and 31. If Dr. Bagley thinks that this negative result is due to the use of a faulty instrument it is to be hoped that he will devise another capable of yielding more valid data. But from his apparent faith in pronouncements based upon inner vision one wonders whether Dr.

Bagley would give much weight to any kind of objective evidence the experimentalist might be able to bring forward.

According to Dr. Bagley, the burden of proof is entirely upon the "determinist." Until he has demonstrated beyond the possibility of doubt that heredity sets its limits, it is our duty to educate all children as if such limits did not exist; until he has demonstrated that the low I. Q. can in no case be brought to average by the arts of pedagogy, it is our duty to act as if all of them could be. In thus resting his case upon the logical impossibility of proving a "universal negative," Dr. Bagley clears the road for the sentimentalist and removes every obstacle from the path of faith. But we can hardly admit the justness of this position. No one has ever proved the impossibility of life returning forty-eight hours after death, yet we do not hesitate to bury our dead within that time. No one ever has proved or ever will prove that the spirit of a departed soul may not return to earth, yet not many of us feel compelled for that reason to believe in ghosts. With respect to any issue we should be guided by the preponderance of evidence. From Galton on down to Thorndike and Davenport the scientist has produced a considerable amount of evidence in support of the hypothesis that one's mental traits, especially his intellectual abilities, are pretty largely determined by native endowment. The hypothesis may or may not be modified when all the facts are in, but by the canons of scientific method it is entitled to stand until concrete evidence has been adduced to show that it is false. Certainly it is entitled to the right of way as a guide to action until something more substantial than sentiment can be brought to bear against it.

The truth is, the spectacular fight which Dr. Bagley wages is largely against a straw man. He reads a meaning into the words of the "determinist" which was never intended and accepts as just the interpretations placed upon their findings by the sensational paragrapher. The psychologist does not propose, as Dr. Bagley unjustly asserts, "to exclude everyone except the high I. Q.'s" from the privileges of secondary education, though he pleads guilty of demanding new types of secondary educa-

tion which would be better suited to inferior intellects than is the typical college preparatory curriculum. The present writer thinks he is fairly well-acquainted with the educational views of his co-workers in the mental-test field, and he has yet to hear from any of them the suggestion that the years of schooling should be reduced for dull children. On the contrary, their constant argument has been that the present shameful record of early eliminations is largely due to an ostrich-like unwillingness to face the facts of individual differences; that a differentiated course of study based upon a frank recognition of these differences would keep the low I. Q.'s in school and insure that their time there would not be wasted. Nor does the psychologist advocate the kind of vocational education for low I. Q.'s that would make them mere adjuncts to machines in the industrial world. He believes, on the contrary, that it is the prescription of a uniform curriculum for all which is most likely to foredoom the dullard to the role of an industrial automaton.

The writer has been considerably puzzled in trying to interpret Dr. Bagley's flings at "social leaders" and the "aristocracy of brains." "It would be easy to show that an intellectual aristocracy is just as reprehensible as an aristocracy based upon family or wealth . . . ." Social leaders, he contends, do not need to be trained; all that is necessary is to train the common man so that he will know when to tell his leaders "where to get off." Special educational opportunities for gifted children are contrary to the spirit of democracy. Presumably, also, it must be undemocratic to provide expensive colleges and universities which only the superior youth may enter. It would be most undemocratic to remind a class of college graduates that they are marked by ability and training for leadership and that they should be sensitive to the obligations which this fact imposes. It is sufficient to teach the common man to tell his would-be leaders "where to get off!"

One can only surmise what Dr. Bagley thinks his opponents mean in urging more attention to the training of social leaders. By social "leadership" he seems to understand some kind of

political or industrial "drivership." He forgets that social leaders include also the Luthers, the Newtons, the Shakespeares, the Darwins, the Pasteurs, the Blackstones, the Edisons, the President Eliots, the Curies, and the Herbert Hoovers. Studies of the biographies of eminent men and women so often reveal the role played by happy accident in bringing the necessary opportunity for genius to "out," that one can be reasonably certain our ancient policy of "laissez faire" has lost us many a potential leader in the realm of science, literature, politics, and morals. It is entirely improbable that the name of Newton would have been known today but for the fact that he had a discerning uncle who recognized the boy's intellectual superiority and had him sent to a school for gifted youth (Cambridge). Thus by sheer accident the greatest intellect of modern science found its opportunity.

Far from believing (as Dr. Bagley charges) that the function of the school is to certify brain quality rather than to teach, and far from encouraging teachers to neglect the dull as unworthy of their efforts, the psychologist of individual differences believes that the one purpose of intelligence tests in the schools is to aid us in making the most of every child, the dull as well as the bright. Anyone is at liberty to disagree with him as to the fitness of the method for this purpose, but the purpose itself ought not to be misconstrued.

If anything has been demonstrated by psychology in the last quarter century it is the existence of native differences in mentality. If the psychologist can escape the charge of being an enemy of democracy only by denying his facts, then he must admit that he is an enemy of democracy. The writer, for one, would insist upon a less naive definition of the term democracy. Certainly any definition to be acceptable will have to square with the demonstrable facts of biological and psychological science.

LEWIS M. TERMAN

Leland Stanford University

RETRENCHMENT

Wherever one goes and whatever meetings one attends, one finds that the burden of the anxiety of superintendents and other administrative officers centers around the fact of reduced revenue. In many localities valuations have shrunk, and everywhere the general business depression has tended to reduce rates. Thus from coast to coast those in charge of schools are desperately figuring how they can make their expenditures come within a diminished budget.

It would be remarkably instructive if we could collect the ways in which retrenchment is being effected in various city systems. Action in this respect, as in so many others in life, depends upon our ideas of the value of rival procedures, institutions, or acts. When you tell a friend you haven't had time to write to him, you do him deep dishonor because your days have been full of a number of things, including some of little consequence; yet you have considered them all more valuable than the writing of a letter to him.

Not widely different is it in operating a school system. The things we insist upon maintaining are the things we think most valuable; and the things we first dispense with are those we consider least essential. No matter what fine sentiments we may have expressed in other days, when we are confronted by the cold, hard alternative of making a choice, we come surprisingly close to an expression of our real sentiments.

A superintendent the other day was rather complacently announcing the way in which he had met the problem in his city. In order to maintain his salary schedule (which was one of the things he thought of high value), he had decided to decrease the number of positions by increasing the number of pupils per class. He found comfort in contemplating the investigations of such men as Cornman, Boyer, Harlan, and Elliott, who had shown that almost, if not quite, as effective teaching could be done in large classes as in small—provided the classes weren't *too* large. What seemed to annoy him most was that he had for years been advocating small classes and had succeeded in reducing their size

because of his persistent advocacy. Now, however, in deciding upon this particular type of retrenchment he was placed in the uncomfortable position, as he said, of having to "eat crow." Indeed, he seemed somewhat dazed to find himself maneuvered by the logic of events into his present position. Evidently, it was a surprise to him to find that his advocacy of the small class was really a matter of theory, and that he was willing to abandon his notions when confronted by a condition rather than a theory. The acid test of a money shortage had brought to his attention the fact that he really did not set a high valuation upon the small class.

Similarly, other superintendents are finding that some of the things they have advocated have less real value than they have hitherto been trying to induce others as well as themselves to believe. For example, one superintendent says in substance: "What is industrial education in the senior high school for? I have an expensive equipment and personnel in my senior high school for the purpose of teaching printing, sheet metal work, pattern making, etc. Now I know I am not going to train these children to be printers, or sheet metal workers, or pattern makers. Why am I offering these courses?" This is a question which might well have been asked a few years ago when the money was first appropriated for the installation of these courses. They are probably just as valuable now as they ever were.

Other superintendents are reducing auxiliary service—such as evening schools, play grounds, community centers, and lectures. Americanization, about which we have heard so much, is being curtailed in some quarters. Other superintendents are questioning the value of the kindergarten. One says: "The kindergarten people have never proved their case. They have never even tried to. With instruments of measurement lying all about them for the past few years, they have continued to sustain their cause by a sort of mid-Victorian sentimentality. It looks to me as if the kindergarten were a luxury."

So one after another of those who control the destinies of the public schools decides each in his own way what he thinks

is least valuable among the educational activities of his community. There is very little that is scientific about this. The bases on which the curriculum is simplified, special classes for gifted children are discontinued, and summer classes are abolished, are no more respectable than were the bases on which these activities were established. The practical school man is curiously situated. He must make decisions without having much evidence to go by. Educational research lags so far behind educational practice that it lights the way long after many a traveler has passed by and either lost his way or reached the wrong destination. There is, as we have before said, a need of quantity production in research. By the way, we have not heard it said—although it is doubtless true in some quarters—that retrenchment has led anyone to abolish a department of research where such a department has been established.

On the whole we believe that the necessity for retrenchment is producing more high-class thinking among school men than they have been accustomed to for a long time. Despite the fact that decisions must often be made hastily, we suggest that the superintendent at least owes it to his community and himself to familiarize himself with the evidence concerning matters which he contemplates dispenses with or curtailing. Any good bureau of reference and research can give him some guidance in this particular. But in the name of a long-suffering school public, don't let him broadcast a questionnaire!

With all this effort at retrenchment, however, the better superintendents are not advocating the reduction of teachers' salaries. There is a disposition to maintain the present schedule at all events and at all hazards. We believe this policy is wise; and we advise teachers who may find themselves called upon to teach more pupils or otherwise to increase their teaching load to think twice before criticizing the administration. What the administration needs and ought to have in its efforts to protect salaries is the enthusiastic support of the teaching body. There is a real, and in many cases a desperate, shortage of funds. Information on this point should be honestly and completely pre-

sented to the teachers so that they will understand this to be something more than the annual palaver about high taxes. If this is done, teachers should be expected—indeed they themselves should expect—to assume whatever additional burden may be necessary to save the day for teachers' salaries. In truth nothing but a short-sighted policy would induce them to do anything else. Even intelligent self-interest should lead them to do more work in the next year or two in order that the pay and the respect of teachers may suffer no impairment.

B. R. B.

Reviews and Abstracts

JORDAN, RIVERDA HARDING. *Nationality and school progress; A Study in Americanization.* Bloomington: Public School Publishing Company, 1921. 105 pp.

Dr. Jordan chooses Minneapolis and St. Paul as his field for study. His investigation is a very thorough one and certainly no time nor effort has been spared in trying to determine whether the factor of nationality of school children enters into their progress in school, in so far as this can be determined by a comparison of children of foreign born ancestry and those of distinctly American parentage. The study, however, is too scientific to make it of real value to either the teacher of foreigners or to superintendents. Dr. Jordan attempts to refute the popular phrases of the "bright Jewish children," "stolid Scandinavians," "mercurial Irish," etc.

Studies were made investigating the birthplace of parents, grandparents, and children, also as to whether English was spoken in the home; factors of retardation, acceleration, and school marks were studied. Objective mental tests were given; and other studies were made effecting school progress along such lines as mobility of students, occupation and economic status of parents, home conditions, church attendance, etc. From all these studies involving 39 printed tables, Dr. Jordan comes to the following conclusions:

1. There is no justification either to despise the attainments of the foreign born and his offspring or to sublimate his achievements unduly at the expense of the native American.

2. There are no such marked differences as to justify the popular phrases previously cited.

3. The handicap of the language difficulty does exist and it should be the concern of every American to see that all possible steps are taken to remove this difficulty.

4. There must be more flexibility of the school curriculum in order to reach special foreign groups.

Dr. Jordan's feeling relative to the imperative need of a change in the present Naturalization law will hardly meet with the approval of those who know and work with these foreigners. His judgment is that an applicant is not fit for Citizenship unless his family, as well as himself, speak English, unless he reads only an English newspaper, and unless he attends a church where only English is spoken. It certainly is not true that it is impossible for a man to be a good American citizen until he withdraws himself from any contact with his former homeland. It is quite possible that through these very same contacts he may be of greater influence to his friends of foreign birth. The women in the home are especially handicapped because of the lack of time and opportunity to acquire the English language and it would seem hardly fair to keep men from citizenship because of this almost unsurmountable difficulty.

Springfield, Massachusetts JOSEPHINE D. MASON

ANDREWS, FANNIE FERN (Secretary). *An American citizenship course in United States history.* New York: Charles Scribner's Sons, 1921. 5 volumes.

In 1913 a committee of The American School Citizenship League began working on the report which has recently appeared under the above title. This committee was composed of Messrs. W. F. Gordy, P. P. Claxton, C. E. Chadsey, J. H. Van Sickle, John H. Hall, Mrs. J. W. Hall and the Secretary, Mrs. Andrews. After sitting in "earnest session as many as twenty-six days" the committee was able to lay the foundations for the rather voluminous report which is now before the teaching public for acceptance or rejection.

The course proposed is much like the one suggested by *The Committee of Eight* in 1909. Inasmuch as this report is so well known it seems a waste of valuable space to describe the one under review in any detail. It should be said, however, that instead of stopping after making a few general suggestions as *The Committee of Eight* did, this committee compiled a considerable body of type-study material. This material appears in four books, one for Grades IV and V and one each for Grades VI, VII and VIII. Since the history recommended by the committee for Grade VI, VII and VIII is so universally taught at the present time in these grades this type-study material ought to be of considerable assistance to upper-elementary grade history teachers.

Generally speaking the report will disappoint the reform element in our midst. Many will designate it backward rather than forward looking. It may be we have made no progress since 1909 in the matter of elementary-grade history. Evidently the committee feels that we have made but little, if any. One must not be too critical, however, of the results of the Committee's work, for two of its members, Messrs. Gordy and Van Sickle, were members of *The Committee of Eight* and one would not expect them to admit that there were any serious defects in that committee's report. R. M. TRYON

University of Chicago

HOSIAC, JAMES FLEMING. *Empirical studies in school reading.* (Teachers College, Columbia University, Contributions to Education No. 114) New York: Teachers College, Columbia University, 1921. 174 pp.

The avowed purpose in making this study is "to establish a method of evaluating (literary) reading-books intended for use in Grades IV to VIII of the elementary schools in terms of the questions and other helps to study which they contain." The investigation is carried out along four main lines: (1) The opinions of authorities as to the aims and methods of teaching literature in school; (2) the analysis and classification of the *study helps* found in four sets of popular literary readers; (3) evidence as to the common practice of teachers in teaching literature; (4) experimental teaching to determine the relative value of methods and devices.

The principal conclusions reached in each line of investigation follow: (1) "The weight of authority concerning the teaching of literature to children appears to be in favor of informal methods of treatment—looking to appreciation or enjoyment," and that the recitation "should be devoted chiefly to hearing the selection well read and seeking to enter into the experience which it provides by the exercise of imaginative sympathy." (2) In the four sets of readers "the proportion of space devoted to the notes and helps varies from 15 to 38 percent." The total number of questions was 18,873. The average number per volume was 943. "The overwhelming majority of these questions were found to relate to details, particularly linguistic and informational details." (3) From a study of stenographic reports of eighteen lessons in literature by eighteen different teachers it was concluded; (a) That the teachers emphasized the same interests that were emphasized in the books. (b) That they make little use of questions and study helps, preferring "to conduct their reading lessons in their own way without reference to studies found in textbooks." (c) That there was "a tendency in practice to deal with details at the expense of the whole." (4) "Evidence was obtained sufficient to indicate a strong probability that a piecemeal attack on poetry with formal and ineffective reading aloud and much insistence upon the discussion of details of language, without any attempt to bring the pupils' own experience to bear on the poem as a whole and without any final synthesis, is relatively inefficient as a method of teaching." Hence, "the emphasis was wrongly placed by the editors of the textbooks examined and by the majority of teachers whose lessons were reported."

The important conclusion seems to be that literary reading books are to be valued according to the amount of good literature they contain in proportion to notes, questions, and other study helps. And since such study helps are not in accord with the accepted aims of teaching literature, and since teachers make little use of them anyway, the "space devoted to such studies" is mostly wasted and "might well be given up to good poetry and good prose."

The author's conclusions, so far as they pertain to literary reading-books and to the teaching of literature, are probably valid. But when he confuses the teaching of literature with the teaching of reading, there is room for difference of opinion. His idea seems to be summed up in a quotation from Kendall and Mirick, "In the reading lesson, let the aim be to awaken in them

(the pupils) a genuine love of reading and to lead them into the broad fields of good literature."

Some of us believe that the real aim in the intermediate grades should be to teach children how to read. Only so can they read comprehendingly enough to enjoy good literature. Evidence as to method and content as brought forth by the author indicate the wisdom of divorcing the teaching of reading from the teaching of literature and suggest that purely literary material is not the best material to use in teaching reading.

Indeed it is suggested that the discrepancy between theory and practice which the author finds may be due to the fact that the selections were beyond the comprehension of the pupils, thus necessitating much analysis and questioning upon details.

As a treatise on the materials and methods of teaching literature, the book deserves careful reading. It is well planned and well written, and it contains many valuable suggestions.

S. S. Brooks

Winchester, New Hampshire

Dunn, Fannie Wyche. *Interest factors in primary reading material.* (Teachers College Contributions to Education No. 113) New York: Teachers College, Columbia University, 1921. pp. 70.

The complex field of reading needs scientific evaluation of subject matter and method of procedure. Miss Dunn's contribution is notable in that she attacks the key problem involved—children's interests in reading—and in that she recognizes the importance of these interests in the primary grades, beginning with the first.

After summarizing the interest appeals in reading material of the last one hundred years, two direct challenges are made: that "what is of interest to children of this age has never been demonstrated" and that "no justifiable criterion of literary merit has been set up in making these selections." Yet for a century we have talked of interest as a factor and for half a century have stressed literary values. Fortunately Miss Dunn prophecies that exact scientific information will come in this field as it has in others, then makes her own contribution.

Thirty-one selections comprising fiction, factual material, and poems were selected by competent judges from 243 samples of primary reading material. These selections were read in pairs to 195 different classes in grades one to three, distributed over five states and including a wide range of child types. The children voted on their choice of each pair of selections. Their catholicity of taste is in sharp contrast to current opinions as to their favoring fancy. Poetry receives a very decided blow, indicating that far too much of it is included in our texts.

Twenty qualities present in high degree in the samples were selected by judges, and correlations worked out to show their influence. Some unexpected results appear here. Surprise ranks highest with "animalness" about equal to it for boys, and childness and familiar experience for girls. Plot, narrativeness, liveliness, conversation, and moralness rank high, while humor and

familiar experience are much less important than one would expect. Slight sex differences appear.

The rating of selections according to adult judgments proved little more valuable than a random selection would be. A few individuals succeeded fairly well in making such a rating.

The study closes with a plea for further studies in this field, for an extension of the types of material in our texts to include all dawning interests and to awaken those not aroused, and for the selection of a core of minimum essentials to be given to every child. Especial attention is called to the need for factual material of better quality.

Alert primary teachers will find suggestions here for original work in preparing and testing out new types of material for their grades. Teachers of method courses will appreciate the text for class use. Students of education may gain from it courage to attack vital problems rather than the formal habit-forming procedures which allure because they are so easily reduced to statistical form. Child study specialists will rejoice that a way has been discovered in this important subject for children really to speak for themselves.

FRANCES JENKINS

University of Cincinnati

MYERSON, ABRAHAM. *The foundations of personality.* Boston: Little, Brown & Company, 1921. 406 pp.

Dr. Myerson's book is another venture in the field which John Stuart Mill denominated ethology, and regarded as one of the most important of the sciences. Ethology has in recent years received many interesting contributions, each of which has its distinctive value. Shand's "The Foundations of Character" describes the history of character more from the point of view of the traditional introspective psychology. Jastrow's "Character and Temperament" is popular in presentation, and adds the angle of vision of the experimentalist and the student of unusual types. Wells's "Mental Adjustment" contributes the insight of the psychologist having an extended experience with insanity and various other forms of psychic abnormality. Hocking in his "Human Nature and Its Remaking" gives us the attitude of the philosopher and especially strives to show the significance of religion in the remaking of the natural man.

Dr. Myerson is a physician who specializes in psychiatry and whose experience brings him in contact with many cases varying not widely from normality. He abhors metaphysics and writes in a very interesting style, giving us a popular account of the growth of personal character, its types and the influences that play upon it leading it to attain various kinds of efficiency or to become abnormal or perverted. His account begins at the bottom with the organic and environmental bases of character. It sketches the elementary psychology of memory, habit, emotion, instinct, intelligence, purpose, and will. The influence of various emotions and emotional attitudes in releasing energies and in providing compensations is extensively treated. The theories of Freud are recognized, but the author feels that they afford a very one-sided interpretation of the conflicts in character. The point of view is eminently sane and

well-balanced. While a large part of what he says is just common sense in the interpretation of human nature, he supports his views by a wide range of facts drawn from his medical training and experience, and from an extensive acquaintance with psychology, philosophy, and literature. Not a little of the interest that he evokes is due to his ability to call to his help Dickens, Moliere, or Goethe; Leeky, James, or Bergson, as well as the authorities of physiology or psychiatry and the like. His book is one that may be read with profit and interest by teachers and general readers, and the professional psychologist will not only approve of its sanity, but will find in it many valuable suggestions.

ERNEST N. HENDERSON

Adelphi College

BODE, BOYD H. *Fundamentals of education.* New York: Macmillan Company, 1921. pp. xi + 245.

We have been so busy in these recent years investigating and checking up results in the field of education that we have not had the time or the disposition to take our bearings and find out whither we are going and why. With the exception of the notable writings of John Dewey the speculative aspects of education have been conspicuous by their absence. So we can heartily welcome this new book by Professor Bode in a field new to him. The author has already obtained an enviable reputation in pure (?) philosophy. As a logician and epistemologist of the pragmatic school his writings are well and favorably known. This excursion into the philosophy of education, which by the way promises to be more of a permanent adventure than a brief foray, is full of promise. This first book in educational philosophy is not the last that Dr. Bode will write. I predict that it will be followed by others of perhaps a more fundamental and penetrating nature, but by none more entertaining and vital.

In this essay the writer runs true to form as a pragmatist. He tells us that education must have a definite sense of direction. "Unless we know where we are going there is not much comfort in being assured that we are on the way and traveling fast." But just where are we going; what should be our destination? We look for an ultimate educational aim, but Professor Bode adroitly avoids giving us this information. All aims are good as long as they are relative. There is no *summum bonum.* The true aim of education is to foster intellectual and spiritual growth. "We cannot solve the problems of life in advance. Aims must be worked out as we go on." This means that the most important factor in education is the teacher who is to create and foster the spirit of open-minded inquiry. Thus Bode,—but does he then mean that the end of education is the search for truth? Yes, and no; for while he implies this he asserts more. It is not any kind of growth, not any sort of intellectual activity that will serve the purpose. The growth must be in the direction of social understanding and sympathy. It must result in an evaluation of human life, and teaching must be in terms of a social context. We must arrive at a greater cooperation between members of a social group and also between different social groups. We must realize democracy more completely,—not merely political but social as well. Thus the aim of education is

growth in the direction of greater human understanding and cooperation.

But is not this setting up an ultimate end? It may seem so but Professor Bode is not to fall into such a trap. He tells us that *social* ideals must be developed, but that these ideals are not to be final; they are merely stepping stones. To know the final aim of education would be to know human life completely as it was, as it is, as it shall be. Since this is impossible, for life is as it is lived, and the end is never absolutely achieved until life is at an end, we can have aims only that are relative and tentative. Although Bode does not say this, it is to be inferred that any scheme of social order that we accept to-day may be discarded later. It is also possible that we may be going but not in the right direction. The best that educational philosophy of this type can offer us is to indicate the progress that we are making along a road that leads somewhere. But is this the road we should take if we wish finally to arrive? Probably not, because we shall never *finally* arrive. As long as the road is pleasant and our companions agreeable, and we have plenty to do to keep us alert and active, what more can we expect? So it seems to me we must confess that we are on our way and traveling fast in a certain direction that surely is not a final stopping place. If we keep on we will arrive, put up over night, and in the morning start our car, step on the gas and speed along following the next guide post and reaching the next town, and so on just forever and ever.

Pragmatic philosophy can say nothing more. However, to my way of thinking this relativity is better than the absolutism of the past. Education has suffered far too much because standards have been set up that are unvarying and eternal throughout the ages. In Dr. Bode's book there is life, movement, adventure, the breath of the open country, and the lure of the distant horizon. The discourse is pleasant, well-written, entertaining, replete with common sense, and above all it stands the final test of the pragmatist,—*it works.*

STEPHEN S. COLVIN

Brown University

BROOKS, FOWLER DELL. *Changes in mental traits with age determined by annual re-tests.* (Columbia Contributions to Education, No. 116.) New York: Teachers College, Columbia University, 1921. 86 pp.

The great desirability of repeated measurements on the same individuals over a term of years has been frequently pointed out, not only for the light it throws on changes in mental traits with age, but also on many other related problems. This study, based on re-tests of 171 pupils from the fourth to the ninth grade, ranging in age from nine to fifteen years, is a contribution to this problem. Twenty-five mental and educational tests were given three times, giving a record of change over a two-year period, though only sixty-seven of the subjects took all the tests three times.

An historical survey of the more significant of the many studies on changes in mental traits with age shows few investigations in which the same individuals have been re-tested, and these are chiefly Binet re-tests to determine the constancy of intelligence quotients.

After reporting in detail gross scores and the median yearly improvement for each age, test, and sex, the writer sets out making the different gains and rates of gain comparable by dividing the different gains by a constant—the average of the eleven-, twelve-, and thirteen-year standard deviations of each test for each sex. The resulting table shows a bewildering variation in the amount of gain in the different tests at different ages. They resisted interpretation without classification. The data were classified on a basis of similarity of functions (simpler, memory, higher or more complex, and informational), presence or absence of high scores, influence of school instruction, and ability to make initial scores. When allowance is made for selection which raises the scores at the earlier ages and lowers them at the later ages, and the curves are smoothed by increasing the number of cases and the number of tests, the conclusion is reached that not only are the gains positive at all ages between nine and fifteen for both sexes, but also the rate of improvement is probably best represented by a straight line whose slope is probably slightly negative. A comparison of rates of gain in other investigations, in which case the changes were determined by taking the differences between the central tendencies of groups of different ages, shows substantially the same tendencies except that the gains are much less.

There is no evidence in these data of periodicity or rhythm in mental growth, no evidence of pre-adolescent or adolescent spurts; no evidence of a slowing up in rate after eleven or twelve; and no evidence of a cessation of mental growth before fifteen, the highest age tested.

The correlations between mental traits measured at a two-year interval for the four types of functions are high—the corrected coefficients range from .64 to .99—indicating that the abilities are a relatively permanent endowment. The correlations between gains in different groups of functions are positive though low, and indicate no evidence for the doctrine of compensation, that the gain or improvement in one group of functions stands in inverse relationship with gain in other functions.

This investigation represents the sort of study we greatly need, though the difficulties of giving tests at more frequent intervals than a year without having the results as measures of mental growth vitiated by practice, and over a longer period than two years without being vitiated by selection or reduction to too small a number of cases to be significant, are very great. Accurate individual growth curves, however, we must have, and the sooner we set about getting them the better off we shall be.

V. A. C. Henmon

University of Wisconsin

Ensign, Forest Chester. *Compulsory school attendance and child labor.* Iowa City: The Athens Press, 1921. 263 pp.

One scarcely expects to find more than a recital of facts and figures of a somewhat prosaic nature in a treatise on the above topic. Consequently, the fact that the author has here presented a very thorough study of compulsory school-attendance and child-labor in a manner so vitally interesting, that the reader's attention is held at every point, is no mean compliment to him. Were

there more presentations of this subject written in such a simple yet convincing manner, we might hope to gain more careful consideration of this important question.

Without undue and tiresome detail the author outlines the status of education in relation to employment in England. From this he passes to the development of compulsory education and compulsory employment in America during the colonial and the early national periods. Having laid this broad foundation for the reader, he undertakes to show the gradual development of the movement to protect the child's right to gain an education and in his right to live a normal child-life instead of one of drudgery and practical slavery under unscrupulous masters in industry. Five states, Massachusetts, Connecticut, New York, Pennsylvania, and Wisconsin are chosen to demonstrate the principles which have been operative and those which should be encouraged or avoided, depending upon the desirability of education or the undesirability of child employment. Other states notable in industry and in education were necessarily eliminated because of the incomplete and hazy records of attendance,—a serious indictment against the educational officers of those states.

The purpose of the book stated in the introduction is "to trace in some detail the development of legislation for the control and compulsory education of children from its inception in the English statutes for the restraint and industrial training of the children of the poor to its expression in the elaborate systems of universal, obligatory education with the accompanying elimination of child labor in the most progressive American states." This line of thought is carried throughout the study, giving it a unity and conciseness seldom found. Furthermore, each chapter is carefully organized as a distinct unit in itself with definite purposes and conclusions. An extensive bibliography is appended which is of value not only in giving the authorities consulted, but in furnishing an excellent guide to the student in this field.

C. C. McCracken

Ohio State University

Toops, Herbert Anderson. *Trade tests in education.* (Teachers College Contributions to Education No. 115.) New York: Teachers College, Columbia University, 1921. 118 pp.

Mr. Toops enjoyed an unusually varied experience in the making of trade tests for army use. The book under review is an attempt to summarize the best of his army experience for the use of educators in both academic and vocational schools. The book is full of suggestions for any one who is interested in improving methods of evaluating the results of teaching.

The terms "trade tests" and "vocational tests" are used synonomously by the author who points out that these differ from other tests primarily in their content. He gives the following classification:

I. Tests of proficiency or success in a trade.
  1. Verbal.
    a. Oral administration.
      (1) Army oral.
        (a) Oral answers.
        (b) Written answers.

(2) Pictures.
b. Written administration.
(1) One-word answer.
(2) Multiple choice.
2. Performance tests.

II. Tests of trade capacity, potentiality, or promise. (This group includes practically every known variety of test, including the above verbal forms.)

The author illustrates the several types of trade tests; points out their usefulness as a basis for improvement of instruction, and as a means of predicting success in employment; gives a good analysis of how to make a trade test including the assemblying, revising of material, and the standardizing in terms of groups of known ability; discusses methods of administering tests and of safeguarding teaching and coaching; considers the adaptation of trade-test technique to school examinations; and closes with a chapter of "general considerations in testing and training for proficiency and promise in the trades." Several characteristic types of tests are described in detail.

Mr. Toops realizes the need for and the difficulties involved in making a thorough analysis of the requirements of the job before undertaking to make a trade test. He offers one concrete suggestion as to how to make such an analysis in the form of a "general job analysis questionnaire sheet."

His evaluation of the vocational guidance tests used in the Manhattan Trade School for Girls, New York City, indicates how such an experiment might be better organized, administered, and finally evaluated. He believes this experiment to be "among the foremost vocational guidance programs to be found today."

Students of statistical methods will find the volume worth their attention. Those interested in the philosophical background of trade education and trade testing will find that the author has positive ideas underlying his scientific attitude. The selected bibliography concerning trade tests is quite complete.

Trade Test in Education constitutes a first volume for everyone interested in trade testing. It will be particularly useful to those interested in making trade tests; and to teachers and administrators who are looking for methods of improving the measurement of teaching in their own schools—vocational and academic.

J. Cayce Morrison

The University of the State of New York

Smith, Ehrlich E. *Teaching geography by problems.* New York: Doubleday, Page & Company, 1921. 306 pp.

There is an awakened popular and educational interest in the study of geography. The progress of the World War led the intelligent reader to study his atlas, and the maps in newspapers and magazines with unusual interest. An understanding of the consequences of the War required still keener appreciation of geographic relationships.

Educational journals have published articles concerning the necessity of making geography serve the present-day needs of our national life and its in-

ternational relationships. Superintendents of schools have formulated courses of study in geography to make definite use of the awakened interest in the subject. New books on the teaching of geography have been published to aid teachers and pupils to use to advantage the present-day interest in geography.

Teaching Geography by Problems gives the teacher two valuable points of view concerning geography: (1) the importance of geography in the American educational systems of today; (2) the use of problems, or the problem-method, in teaching geography.

Teachers who have been requested to present their geography work by means of problems without knowing just what the request called for, will welcome this book for the clear, definite presentation of the meaning of problems, and the comprehensive development of selected problems. One chapter is given to a discussion of the following topics: how a problem is selected, organization of topics, quantitative and qualitative treatment, development of problem types, testing the problem, values attributed to the problem method, illustrations of problem types, minimum requirements of place geography.

In the development of these topics, a number of specific problems are stated, some of which are the following:

Why have the Philippine Islands a promising future?
Do you think the United States could afford to sell the Philippines?
What has England done for India?
Why are the Hawaiian Islands a valuable possession of the United States?
Why has Great Britain the largest merchant marine and navy in the world? A suggestive topical outline for the development of this problem is given.
Can Japan be to the East what the British Isles are to the West? This problem is so outlined as to use the knowledge gained in the study of the preceding problem.

Nearly one-half of the book is devoted to "Illustrative Problems" suitable for use in various grades.

A study of *Teaching Geography by Problems* will show the teacher that the "problem method" which has sometimes startled her is not something new and strange, but that much of her best teaching has always been done by the use of problems. The superintendent who wishes to develop the problem method in his schools in a natural and helpful way will find this book an aid to him and his teachers, not only in geography, but in other subjects as well.

DOUGLAS C. RIDGLEY

Clark University

News Items and Communications

This department will contain news items regarding research workers and their activities. It will also serve as a clearing house for more formal communications on similar topics, preferably of not more than five hundred words. These communications will be printed over the signatures of the authors. Address all correspondence concerning this department to Doctor E. J. Ashbaugh, Ohio State University, Columbus, Ohio.

"In the April number of the Journal (page 346) announcement was made of the Douglas Standard Test and the Gregory-Spencer Geography Test. The place of publication of these tests was erroneously given as the University of Washington. These tests are published by The Bureau of Educational Research, University of Oregon, Eugene, Oregon. We regret this error."

In an address telling of the uses of intelligence tests in Normal Schools, Miss Bessie L. Gambrill, affirms that intelligence tests will not give all the "facts that are required for prognosis of a student's probable success as a teacher. There are other qualities, such as the dynamic personality traits, the absence of which will cause failure in teaching, no matter how highly endowed intellectually an individual may be."

Mr. Edward D. Randolph, now assistant to Dr. Bagley at Teachers College, Columbia University, has been elected as professor of educational sociology at the University of Washington. He will enter upon his duties in the autumn quarter, 1922. Mr. Randolph was for several years in charge of the work in educational sociology at the State Teachers' College, Greeley, Colorado.

Superintendent Allen of Springfield, Illinois, gives research men a valuable suggestion when he proposes as an important practical school problem, the determination of the work of each grade, and in each subject; this work to be expressed in terms of achievement. Not only the teachers and school officials but interested parents would be benefited in their efforts to adjust the school to the child by knowing precisely what is expected in arithmetic in the third grade or in geography in the sixth grade, or in any subject and grade of the elementary school. Each school system should be prepared to furnish this information. Since there is no reason why the standards should differ, for the fundamental subjects at least, in the first six grades, we ought to have standards substantially uniform for all systems.

Superintendent Newlon of Denver reports that he has received 73 questionnaires since last December. Everybody, including Mr. Newlon, agrees that in respect to questionnaires "Something ought to be done." The questionnaire is a necessity. It is the abuse of it to which we are calling attention. If we had a coordinating agency which should advise makers of question

blanks so that duplication might be avoided and frequent topics surpressed, an undoubted benefit would be conferred, not only upon those who receive such blanks but also upon educational research.

It is reported that Detroit has raised the number of high school pupils per teacher from 25 to 35. This has been done in order to reduce the number of positions and thus maintain individual salaries. What effect this will have upon the efficiency of instruction is not known. It is certain that many cities are confronted with reduced revenues in proportion to the work to be done, and Detroit is not alone in the adoption of this device.

We are informed that Teachers' College, Columbia University, requires graduate students and faculty members to secure approval of questionnaires. This statement of approval is put on the questionnaire where the recipient can see it. Either on the questionnaire or in the letter of transmittal, the request is made that questionnaires emanating from Teachers' College but not regularly approved be disregarded, and that if questionnaires without approval are received, Teachers' College be notified.

The Woman's College of Alabama has this year enlarged its Department of Education by the addition of a full course in practice teaching. This has been accomplished by cooperation with a local public school. The work was entered into with fine spirit on the part of the students and has proved most successful. A similar arrangement will be continued next year.

The Bureau of Education, Reference and Research of the University of Michigan is directing a cooperative testing program in that State, covering the fields of spelling, reading, and arithmetic in the elementary grades; and Holtz's Algebra, Brigg's English, and Henmon's Latin and French Tests in high school.

The spelling survey has one unique idea in that a uniform list selected from the Buckingham Extension of the Ayres Spelling Scale is to be used by all systems cooperating and an additional list made from the same sources by the superintendents involving words which have been taught sometime in the school life of the child will also be used. This will afford a check against the results obtained from the uniform list by using additional words which it is certain the children have been taught.

Some interesting facts regarding the health of gifted children has been revealed by a three-year nutritional experiment carried on by a New York City school.

"Gain in fitness was greatest on the part of unusually 'bright' children. A number of children having intelligence quotients of 125 or over were examined and a larger percent of underweight was found among them than in any of the groups studied, yet under improved conditions, they responded better than the others. 'Gifted' children probably need a more ample allowance of sleep, fresh air, and food than average children and are the very ones least likely to spend their time in out-of-door play or to go to bed early, with consequent lessened appetite and powers of assimilation."

As an evidence of the economy in administration which the administration of senior-high schools at Columbus, Ohio, has been putting into effect a showing is made of a reduction in the number of vacant rooms in the five high schools of the city together with a reduction in the number of teachers. The latter has been made in the face of an increase both in the number of classes and in the number of pupils. Rooms were vacant for 94 fewer periods per week this term than last, four fewer teachers were in service, 98 more classes were organized and the enrollment increased 451. The average number of classes per teacher last semester was 5.22, this semester 5.89. The average number of pupils per teacher was 24.3 last semester and 27.4 this semester. Anyone who knows anything about the administration of a large city system knows that these results were not obtained without close and careful planning.

Bulletin No. 1 of the Bureau of Business Research of the University of Illinois is entitled "Illinois Taxes in 1921." Certain pertinent facts, which are pointed out to the taxpayers of the state, are of particular interest to school people.

Nine-tenths of the money arising from the general property tax was spent for local purposes, and less than one-tenth was appropriated by the legislature. More than one-half of the money appropriated by the legislature was for highways and waterways; only one-sixth of the total amount appropriated by the general assembly was for education. The state has a large source of income other than property taxes, and this source is tapped to care for general expenses, while the school distributive fund is taken entirely from the general property tax. The average taxpayer on scanning his tax receipt gains the impression that increased appropriations for education are responsible for the increase in the state tax rate. This is decidedly incorrect and misleading.

Of all funds going to the local government in 1921, 37½ percent was expended for public schools.

Have you seen the new "School Accounting Report" developed and proposed by a joint committee representing the Bureau of Education, the Department of Superintendence of the N. E. A., The National Association of Public School Business Officials, and The Inter-City Conference? We have lately received a copy of Part II of this report. It has reference to financial statistics. Its classifications have probably been more carefully worked out than any classifications which have hitherto been proposed. The discussions and definitions which accompany the report add very greatly to its value, since they increase the probability that the reports will be made out in a substantially uniform manner. Copies of this blank may be obtained from A. B. Moehlman, Director of Reference and Statistics, Board of Education, Detroit.

Part I is the usual form employed by the Federal Bureau of Education. The organizations which proposed Part II have been concerned merely with the financial section of the Federal Report. In other words, Part I stands as it always has.

We have recently received from Superintendent C. B. Smith of Princeton, Illinois, a copy of a test in use in that county, and known as the Bureau County Standard Test in Speech Error Correction. It was devised by Super-

intendent Smith at the request of the County Superintendent in order to check the extent to which the teachers who cannot have much supervision have successfully taught the course of study. The test consists of 20 sentences for each grade, a number of which contain an incorrect language form. The child in taking the test is to place an *r* after each correct form and an *x* after each incorrect form. The score is the number of right minus the number of wrong answers multiplied by 5.

This is an interesting piece of problem work. The test is not completely diagnostic since children may be able to recognize some incorrect forms without being able to correct them. This, however, is not a serious fault considering the purpose for which the test was devised.

It is a most hopeful sign when local school officials recognize the value as instruments of supervision of more or less uniform tests which lend themselves to objective scoring. The efforts of such men as Superintendent Smith are certainly to be encouraged, and the assistance of those who have training and experience in the work of devising educational tests will most gladly be given.

Dr. H. L. Camp, Assistant High School Visitor for the University of Illinois presented some data on the use of general intelligence tests before the National Association of High School Supervisors and Instructors at the Chicago meeting of the N. E. A. which is worth a wider distribution than the membership of that Association.

Dr. Camp endeavored to ascertain the extent to which general intelligence tests were being used throughout the country. He received reports from 80 percent of the states; and while the men addressed expressed themselves enthusiastically in favor of tests, their reports indicate a rather surprising lack of systematic work. No state in the Union has conducted anything like a state wide survey of intelligence. The nearest approach to it was in Indiana where the Indiana Intelligence Scale, Schedule D was given to 6,188 seniors in 320 high schools.

The Terman Group Intelligence Test was mentioned as having been used by workers in 15 states; the Otis in 14; The National in 13; and the Army Alpha in 10. Less frequent references were made to the Illinois Examination; Chicago Examination; Indiana Intelligence; Thorndike High School Examination and College Entrance Examination; Army Examination and Tests by Haggerty, Miller, Trabue, and Myer.

A "deficiency survey" of the high-school pupils who have been reported as doing unsatisfactory work during the first semester of this school year has been made by Principal H. C. Koch of Mt. Vernon, Ohio. Little agreement was found between pupils and teachers as to the reasons for low marks. A larger percent of deficiency was reported for pupils from the neighboring rural school than for those from the local schools.

The intelligence score of the 256 unsatisfactory pupils was compared with the scores reported for 5520 high-school pupils in the Manual of the Army Alpha Intelligence Scale. Only one-quarter of these unsatisfactory pupils had

intelligence scores equal to or above the median of this larger group. No cases in the army group were rated D or D—, while one percent of the unsatisfactory pupils at Mount Vernon were so rated.

This study disclosed several needs among which were: (1) classification of students on the basis of mentality; (2) gradation of requirements within courses from mere fundamentals to a high degree of enrichment; (3) a survey of pupil's needs, habits, and home conditions; (4) a thorough campaign of education of parents in home-school responsibility.

The Tax Campaign in St. Louis

March 28, 1922, saw the close of a campaign for the maintenance of the tax rate for schools of 85¢ on the $100.00 in St. Louis that in many respects was notable.

On that day the tax payers of the city of St. Louis by a vote of little less than three to one approved the maintenance of the existing tax rate of 85¢ on the $100 which actually was a continuance of an increase of 25¢ over the rate of 60¢ allowed by the State Constitution. In order to maintain that rate, public-spirited citizens combined with public school teachers and pupils to wage what proved to be a resistless campaign of publicity and persuasion. The voter was appealed to from every angle. A Committee on Statistics and Research which had been organized early in the campaign compiled quantities of data upon school questions of almost every conceivable variety. These data were freely drawn upon by other committees and by speakers with the purpose of presenting the claims of the public schools to the men and women of St. Louis in the best possible light.

Another committee which performed a remarkable piece of work was that on posters and display. Prompted by this committee boys and girls in the high schools and pupils in the elementary schools from the first to the eighth grade prepared striking posters in colors with colored crayons and crayola. These posters were distributed over the city and were displayed from the windows of private homes as well as of department stores, factories, and wholesale business houses.

The committee on speakers completely covered the city. It arranged for meetings in every public school. It sent five-minute speakers to factories and other industrial plants during the noon hour. It secured the approval of the Ministerial Alliance to an educational Sunday, when the churches appealed to their membership for support of the school tax rate. It secured the approval of countless organizations, both those identified in some way with the school and its life or unrelated organizations, like the City Central Committees of the various political parties, labor unions, civic and philanthropic and miscellaneous business clubs and societies.

The Committee on Publicity after securing material from the Committee on Statistics and Research worked it up and, with the assistance of the president of a prominent advertising company, phrased its appeal in a form approved by the best advertising practice. Through this committee the schools were circularized, a campaign of publicity was pursued in the newspapers by

means of news articles and advertisements and with the cooperation of moving picture houses patrons of the screen were for four weeks nightly greeted with appeals based on civic pride and love of the public school to "Vote YES and Scratch NO, March 28th, 1922."

One of the most telling features of the campaign was the composition and singing of school songs advocating the approval of the tax rate. This succeeded in bringing to the surface an astonishing amount of latent talent which otherwise the schools would not have known they possessed.

Comment on Professor Knight's Recent Article

May I be permitted a word of comment on the conclusions reached on the basis of data presented in an article in your Journal for March, 1922, by F. B. Knight, entitled: "Qualities Related to Success in Elementary School Teaching."

I am particularly interested in the explanations offered by Mr. Knight for the finding of zero correlations between two sets of "ascertainable facts concerning the teachers" and "the degree of success they were obtaining in actual class-room work" namely "(1) professional study during service, and (2) mental tests."

I. I do not think that Mr. Knight should be "confused by the absence of relationship" between the "amount of summer school and Saturday work in educational courses" and "skill in teaching." The expected correlation would probably be found to exist if the persons who took this work did so out of motives of intellectual curiosity and professional ambition originating within themselves. The fact that the correlation does not exist, seems to me to be due to a situation easily observable at any summer session, namely: that an important proportion of teachers attending these sessions do so under compulsion of various kinds not related to the motives above referred to.

II. It seems remarkable that Mr. Knight should offer in explanation of the absence of correlation between the mental test and teaching ability, the opinion that "too much intelligence might also be a handicap." A too active mind, "he thinks, might well be so constantly aware of unsolved problems . . . . that superior intelligence would get in its own way in the rather humdrum and steady grind of elementary-school teaching."

It seems difficult to believe that superior intelligence, which in all likelihood is also creative and contributing intelligence, should run away from unsolved problems. Is it not the business and tendency of such intelligence to assist in the solution of such problems? May one be permitted to refer to the author's attempt to solve one of the obviously difficult problems of educational administration as an apt example of the contrary idea?

It would seem to the writer that the reason for the absence of correlation between the mental test and teaching ability is to be found in the fact that the higher up we go in the scale of intelligence, the less reliable does the quantitative score become, and the less important do the apparent distinctions in quantitative differentiation become. To give an illustration: in the Stanford-Binet scale, a distinction of fifteen points does not always have the same significance. Between I. Q. 65 and I. Q. 80 it means by almost any definition, the

difference between feeblemindedness and normality. On the other hand, between I. Q. 145 and 160, the difference is of comparatively negligible significance. As between persons of that intelligence status, the merely quantitative measure has become useless. To quote another example: A group of children all of them having I. Q.'s between 125 and 140, is from the point of view of the available quantitative means of distinguishing between them, a homogeneous group, but they differ qualitatively. This becomes very obvious when one attempts to apply the Stanford-Binet test to the measurement of very superior adults. One might find ten adults all of whom answer every single question of the Stanford-Binet scale satisfactorily. In that case the scale simply does not function; it does not measure; it does not differentiate. Furthermore, an attempt to extend it would probably prove futile.

The demand of the moment is for an intelligence measure which will differentiate qualitatively between members of a quantitatively homogeneous group. This is the next great problem of applied psychology.

When one bears "in mind . . . . that all the teachers involved in this study were in the *upper portion of the total range of intelligence,*" it is *not at all* "evident that a mental test is not a good selective device as far as elementary school teaching is concerned." The thing that is evident is that when the distribution of intelligence falls within a comparatively small range, and that range the upper portion of the total distribution, it fails to function as a method of differentiation between members of the group. A qualitative differentiation tending to discover within a quantitatively homogeneous group those members whose intelligence tends in the direction of good teaching would function. Is it not possible that the Knight-Franzen Test for elementary school teachers showed some correlation because it does in fact tend toward being such a qualitative intelligence test?

JOHN LEWIS HORN

Mills College

A Prophet in His Own Country

Mr. J. L. Stenquist, whom our readers will doubtless remember as the author of two recent articles in the Journal, articles in which he stresses the unreliability of individual intelligence scores and makes out a case for the child of low I. Q., has not been saved from attack by his failure to join the ranks of those who uncritically accept the results of intelligence testing. Principal Gilbert J. Raynor of the Commercial High School of New York falls foul of Mr. Stenquist in the April 1922 number of the "Bulletin of High Spots." In his attack Principal Raynor succeeds in exhibiting a surprising degree of intellectual discontinuity. Mr. Stenquist, at the suggestion of Superintendent Tildsley, (who, according to our last information, was a district superintendent assigned to high schools) arranged to give a series of intelligence tests at the Annex of Commercial High School to the boys who were failing in all subjects. At the outset Mr. Raynor quotes Mr. Stenquist's report as follows:

"These boys, as a group, are of exactly average intelligence."

"It is clearly shown that several boys have marked ability, not only in mechanical ability, but in intelligence . . . "

"As compared with men in the army who are clerks, this whole group ranks much higher."

"Other causes are apparently responsible for the failure of these boys in the first term of high school."

After the above quotations Mr. Raynor declares that these conclusions "are so wide of the facts as to be almost humorous." From this point on the argument seeks to show first, that the tests were inadequate. In suggesting a more extensive program, Mr. Raynor not only suggests the use of a "comprehensive series such as that given in Whipple's Manual" but also suggests an investigation of family history, medical history, a physician's examination and a dip into the pupil's previous school record. This is the first *non sequitur*. We wonder whether the writer would have advised Mr. Stenquist to give *all* the tests which are described in the two volumes of Whipple Manual. Either Mr. Raynor doesn't know the scope of Whipple's Manual or he is suggesting a testing program of such magnitude in order to discredit any testing program. But this is not the point in the non-sequential character of Mr. Raynor's thinking. He wants family and medical history, and a physician's examination. This is not what Mr. Stenquist was asked to do. According to Mr. Raynor's own words it was at the suggestion of Dr. Tildsley that Mr. Stenquist "arranged to give a series of intelligence tests." If Mr. Raynor wanted a physician's examination or if he wanted an investigation of family history or of each pupil's previous school record, these were other matters and for the most part the school records should have contained the information. To obtain such data was certainly no part of the task which Mr. Stenquist undertook—namely the giving of a series of intelligence tests.

A second defect in Mr. Raynor's line of argument gathers about his misquoting from Mr. Stenquist's report. As above stated the report reads "the boys, as a group, are of exactly average intelligence." At this point, however, Mr. Raynor makes Mr. Stenquist's report read "these boys are of exactly average intelligence." The omission of the words "as a group" is well suited to the development of the line of attack which follows. Presumably Mr. Stenquist had shown that the average or median intelligence quotient for the group was in the neighborhood of 100. This would entirely justify the statement as made in his report but it would not justify the garbled quotation which Mr. Raynor used from the report.

But the more astonishing feature of Mr. Raynor's paper is that it is a precise justification of Mr. Stenquist's conclusion that "other causes are apparently responsible for the failure of these boys in the first term of High School." Mr. Raynor relates how he interviewed personally each one of the boys whom Mr. Stenquist had tested. This was undoubtedly a good thing to do and we should have supposed he might have done it as part of his job without the pugnacious incentive which apparently actuated him. The information he obtained from these interviews and from interviews with the parents was most illuminating. He finds that any suggestion that these failures were due to poor teaching is ridiculous. So far as he has quoted Mr. Stenquist there is no suggestion to this effect. The following facts were disclosed concerning some of these boys: (1) an abnormally large amount of absence, (2) a disinclina-

tion to attend high school, (3) unwillingness to study, (4) "pitiful" home conditions, (5) poor physical conditions, (6) incorrigibility, and (7) physical exhaustion due to too long hours of outside work.

In piling up these "other causes" Mr. Raynor is unconsciously corroborating Mr. Stenquist's view that these other causes were "apparently responsible for the failure of the boys." Indeed it would have been easy for Mr. Raynor, using exactly the same data, to have written an article in support of Mr. Stenquist rather than in opposition to him. In truth it is the animus of this paper rather than the facts adduced which justify us in calling it an attack. Undoubtedly there is something behind this. Perhaps Dr. Tildsley's suggestion that intelligence tests be given was not acceptable to the principal. So far as the suggestion implied that a complete or even satisfactory determination of the causes of failure on the part of these pupils would be thus afforded we should agree with the principle entirely. So also would Mr. Stenquist who has been one of the foremost among the makers and users of tests to point out their limitations. But Mr. Stenquist is in the employ of the New York Board of Education. If a superintendent suggests that he give a series of intelligence tests, all that can be expected either by the superintendent or anyone else is that the intelligence tests be well selected, carefully given and rated, and sanely interpreted. If an expert not in the employ of the Board of Education had been brought in to do this testing, it is probable that his work would have been more highly respected. A prophet is not without honor save in his own country.

Denton L. Geyer of the Chicago Normal School has been using the 21st Yearbook of the National Society for the Study of Education as a textbook in a course on intelligence testing. He has conceived the idea of the development of a standardized test on the material of this book, to be used as a final examination for the course. He has devised such a test and on the basis of his results during the past quarter he secured a correlation of 0.30 with the average scholarship of his students for the previous semester.

Since a great many teachers in universities, colleges, and normal schools will doubtless use this book to a great extent in the courses this summer, they may be interested in communicating with Mr. Geyer relative to the test which he has devised.

Superintendent F. H. Bair of Colorado Springs reports the following salary schedule for the current year: minimum salary $1,200; maximum for teachers with two years preparation beyond high school, $1,950; for those with three years beyond high school, $2,140; for those with four years but without a degree, $2,400; for college graduates, $2,700; and for those with the M. A. Degree, $2,800. Salaries are the same in all grades for the same degree of preparation and teaching experience. To encourage professional growth, the Board provides a $100.00 annual increment to the salary for attendance at a standard summer school. As a result of this provision 50% of the teachers attended last summer and more will attend this year.

The following letter was lately received by an applicant for the superintendency of the schools in a community of 7,000. It is certainly surprising that there are communities of that size in the United States in which the attitude shown in this letter is taken.

Mr. ————————
New York City.
Dear ————————:

Your application for Superintendent of the ———— schools has been received, together with your references. It is so uncertain as to whether we will have a school that I deem it but fair to you to write you about it. Unless some radical change takes place in the disposition of our people, it looks very much as if we will have no school during the ensuing year. I am filing your application and references for future consideration. I am frank to say, however, that it will be very unwise to depend on securing a position in our schools for the coming year, owing to the circumstances related.

Yours very truly,

————————, Secretary.

Salaries and Cost of Living

Mr. Don C. Rogers of the Bureau of Educational Service, State University of Iowa, has recently given out the results of a study on salaries and cost of living affecting superintendents, principals, and teachers in that state. Salaries for 1921-22 showed increases over 1920-21 in most types of work and groups of cities. When both sexes were compared and cities of all sizes considered together, median salaries for the past year showed as follows: superintendents, an increase of $123.00; high-school principals, an increase of $12.00; high-school teachers, an increase of $36.00; grade teachers, a decrease of $5.00.

The average cost of board for teachers in April, 1922, (on the basis of returns from 80 cities and towns in the state) was $7.04 per week as compared with $7.32 for April, 1921. On the other hand, the average payment for rent was $2.78 as against $2.75 the previous year. This indicates that so far as these two items of cost of living were concerned, the H. C. L. for an average teacher decreased $1.00 per month.

In view of the insistent demand in many quarters for reduction of teachers' salaries for the coming year on the basis of decreased cost of living, this study is pertinent. When these figures are considered in connection with the fact that teachers' salaries did not begin to rise until the school year 1918-1919, one cannot logically agree that reductions in salaries are justified.

Coordination of Research

A sub-committee of the N. E. A. Commission on the Coordination of Research Agencies met in Chicago on April 29 and 30, 1922. The following were present: Newlon (chairman), Bobbit, Briggs, Buckingham, Cary, Courtis, Dickson, Norton, Pickell, Studebaker, and Theisen.

The decisions of the meeting are important to those interested in educational research. It became at once evident that the creation at the N. E. A.

headquarters of a research department had given the Commission an opportunity to be definite in its recommendations. The agency by which the methods approved by the committee were to be put into effect seemed naturally to be this new research department. One might reasonably feel a bit sorry for Director Norton. To be called upon to "function" in so many different ways so soon after being appointed to a newly-created position seems rather rough treatment. Mr. Norton, however, appears to be determined to meet the wishes of the committee as far as it is humanly possible. If he fails to put into effect the many suggestions of the committee, it will probably be because of a lack of resources.

The sense of the meeting was expressed in a number of particulars, to a few of the most important of which we refer.

It was suggested that a working reference library should be set up in the research department and that it should be catalogued and indexed for use in furnishing data to school people.

It was further suggested that the department act as a clearing house, and that as such it should gather information, formulate statements of current and future problems, and render service to school people. This service, it was suggested, might be largely on a self-supporting basis. Committees were appointed, subject to ratification, as follows: (1) to work out a classification of educational activities and functions (Briggs, Courtis, and Buckingham); (2) to ascertain the present and probable research activities of departments of the N. E. A. and to report a plan for coordinating the work of these agencies (Dickson, Studebaker, and Melcher). Committees were also recommended as follows: (1) an advisory committee to work in cooperation with the research department in formulating policies and plans of the department; (2) a committee on publicity to create through every kind of publicity medium a correct impression of present-day educational ideals, methods, and tendencies. It was added that the work of the publicity committee should be adequately financed.

Much discussion of the troublesome topic of questionnaires was held, especially as to their abuse and the duplication involved in them. Feeling that the N. E. A. through its research department could do something to control the situation, the members of the committee passed a resolution making the research department responsible for the coordination of the information-collecting activities of educational agencies by formulating, issuing, tabulating, and making available through publication or by other means, standard questionnaires on topics of major importance for use by those interested in educational problems. In further definition of this position, the following procedure was recommended:

(1) The Director of the Research Department about May 15th should send communications to a selected group of varied educational agencies requesting a statement of the major problems in which they are interested.

(2) Based upon the replies to this communication, the Director should prepare a list of the problems of most common interest and submit the list not later than June 15th to the members of the Commission

on the Coordination of Research Agencies for criticisms and suggestions.

(3) Not later than August 15th the Director should submit to the members of the Commission for their criticism and suggestions detailed questionnaires covering the topics selected by him together with specific plans for conducting investigations based upon these questionnaires either through the central research department or by allocation to other responsible persons and agencies.

(4) The Director should issue in the September or October number of the Journal of the N. E. A. (in the name of the Commission if advisable) a statement of the general plan together with a calendar showing the approximate dates upon which the results of the various investigations may be secured from the central research office or from the cooperating agencies.

(5) As rapidly as proves feasible this plan for coordinating the collection, compilation, and distribution of desired information should be extended to include a wider and wider range of problems.

At the conclusion of its deliberations the committee passed the following resolution: "The Commission, realizing the broad scope and large expense connected with any adequate plan of organizing the investigational activities of the nation, recognizes that no agency for the coordination of such activities will be adequate except that which has the prestige of a Federal Department of Education as proposed in the Towner-Sterling Bill."

Time Distribution in Some Louisiana Schools

The Callender Laboratory of Newcomb College studied the time distribution of about 25 percent of the city school systems and 20 percent of the rural school systems of Louisiana. The purposes of the study were: to obtain a basis for a study of the most effective time distribution; to learn what subjects were allotted the greatest or least amount of time and emphasis and hence, upon which most or least time and energy were expended; and to find the relation between the amount of time and the results of instruction as revealed by standardized tests. In studying the problem, the definition of subjects followed the scheme used by Holmes in the Fourteenth Yearbook of the National Society for the Study of Education.

In comparison with the findings of Holmes, the Louisiana schools give less total time to each subject than the northern cities with the exception of opening exercises, penmanship, and physical training. The rural schools give the same amount of time to penmanship as northern cities and more to sciences. The Louisiana city schools give a greater proportion of the entire school time to recitations than do northern cities except in history and sciences. The rural schools devote a greater percent of time to science and history than do the schools reported by Holmes. The variability of time distribution is less in every subject than in the schools of the Holmes' study.

All schools offer spelling, reading, and arithmetic through all the grades and over 90 percent of the rural schools also give language, geography, and

history. All city schools give language, and 90 percent give history, but only 60 percent report geography. Penmanship is reported by 85 percent of the rural schools and by all city schools. It is continued through the grades by the majority of the rural schools, but beyond the fifth grade by only 30 percent of the city schools. The variability in the amount of time allotted to each subject in the different grades seems ample reason for raising the question as to what constitutes the basis on which time distribution was made.

When the time allotted is considered according to subjects, two features stand out prominently: (1) variability, and (2) the regular appropriation of the larger portion of the time by the formal subjects. City schools show least variability and smaller rural schools the greatest. Country children spend 92 hours more per year in school than do the city children. Recitation periods are longer in city schools and study periods are longer in the rural schools. If the average time for all grades is taken as a basis, a pupil passing through the rural schools will spend the greatest part of his school career on reading with the following activities in decreasing amounts: recess, arithmetic, language, science, penmanship, geography, history, spelling, miscellaneous, community work, agriculture, opening exercises, industrial training, and drawing. Similar arrangement for a city child would be: reading, arithmetic, language, physical training, penmanship, miscellaneous, spelling, recess, geography, opening exercises, drawing, history, community work, and agriculture.

The time allotted for study periods shows a similar concentration; for 65 percent of the study time in the rural schools is given to reading, language, spelling, penmanship, and arithmetic; while in the city schools 85 percent of the study time is given to reading, language, spelling, and arithmetic. The city schools assign more of both recitation and study time to the formal subjects than do the rural schools.

COMPARISON OF LARGEST AND SMALLEST TIME ALLOTMENT

Subjects	Recitation		Study	
	Rural	City	Rural	City
Reading	25	7	42	10
Language	50	4	19	2½
Spelling	30	8	24	2
Penmanship	8	2	12	
Arithmetic	36	4	18	10
Geography	8	3	12	2
History	7	7	15	2
Science	20	2	12	1½
Drawing	18	10		
Agriculture	4			
Community Work	9	1¼	14	1¼

The data are read thus: in reading, for example, the rural school giving the most time to this subject allows 25-times as much time to it as the school giving the least amount of time; the city school making the largest allotment devotes 7-times as much time as the one making the least time allotment. The largest amount of study time for reading in rural schools is 42-times the smallest, and in city schools, the largest is 10-times the smallest.

Where such variability exists in the expenditure of time and energy, great differences should also exist in the achievement. Only through the use of standardized tests are we able to determine the extent to which variability in achievement justifies this great variability in time expenditure. May it be possible in the near future to plan a more economical and effective time-distribution based on such test results!

DAGNY SUNNE

Newcomb College

The Program at San Jose

A splendid program was rendered on May 19 and 20 at the Conference on Educational Research and Guidance of the San Jose, California, State Teachers College. A number of the best research people on the Pacific Coast were on the program. President Kemp made the opening address on the morning of May 19 and Dr. Proctor talked on "Vocational Guidance." Dr. Franzen of Des Moines seems to have been the only person from east of the Rockies who contributed to the program.

A remarkable series of papers was presented in the afternoon on the general topic of gifted children. Professor Terman led the discussion presenting a paper on "The California Survey of Gifted Children." Dr. Dickson discussed "The Treatment of Gifted Children in Oakland." Dr. Dorothy Yates gave her "Impressions from Two Years Spent in Testing Gifted Children." Dr. Grace Fernald presented material on "Teaching Results in the Case of Bright Children"; and James C. DeVoss gave a talk along somewhat the same lines entitled "School Success of Gifted Children." The discussions ended with a paper by Dr. Esther Gaw on "Testing for Musical Talent."

Dr. J. Harold Williams delivered an evening address on "Some Aspects of Delinquency."

On May 20 a conference on school surveys was held, the discussion being led by Dr. Sears. He addressed the conference on "Fundamentals in Surveying" and was followed by Dr. Hart on "Building Surveys and Building Programs," Dr. Sutherland on "The Teacher and School Surveys," and Dr. Freeland on "The Principal and the School Survey." Dr. French of the Bureau of Research at the University of California and Mr. DeVoss of the Bureau at San Jose State Teachers College reported concerning their organizations.

The final conference was on "Adjustment." Dr. Dickson led the discussion, his formal topic being "Mental Tests and Their Significance in High School." At this session Dr. Breitwieser reported on the "Mental Survey of Modoc County," and Dr. Williams on "Mental Tests and Delinquency." State Superintendent Will C. Wood spoke on "Adjustments in California."

This was evidently worth listening to. The folks on the Pacific desire to organize a division of the Educational Research Association. We feel that they should be encouraged in this plan. They have the strength both in numbers and in quality to make a strong organization, and their isolation prevents their regular attendance at the annual meetings of the national organization.

Predictive Value of Scholastic Marks

By the help of people who know the graduates of the Kansas State Agricultural College three lists of 50 graduates each were selected for study. List one was made up of those who are highly successful, each in his own vocation; list two of those who have made an average success; and list three of those who are ranked below average in success. All these graduates have been out of college ten or more years.

The scholastic marks given to these 150 graduates during their four years in college were tabulated with the following results, E representing the highest and F the lowest marks:

	E's	G's	M's	P's	F's
	% of total marks	% of total marks	% of total marks	% of total marks	% of total marks
Highly Successful	29	46	19	6	0
Average	4	14	52	23	7
Below Average	1	5	19	62	13

Tentative Conclusions:

1. If 75% or more of the scholastic marks of a graduate of the Kansas State Agricultural College are E's and G's he will be likely to be highly successful in his life work.

2. If 75% or more of his scholastic marks are M's and P's he will be likely to make an average success in his life work.

3. If 75% or more of his scholastic marks are P's and F's he will probably rank below the average in his life work.

EDWIN L. HOLTON

Kansas State Agricultural College

In a pamphlet published by the Children's Bureau of U. S. Department of Labor Dr. Wm. Healey reports a study of delinquency among children.

"A table of 1,200 juvenile offenders distributed according to their 'intelligence quotient' shows that the great bulk of the repeated offenders come from children of 80-100 I. Q. There are as many offenders between 110 and 120 as there are between 60 and 70 I. Q. There are more offenders between 100 and 110 than there are between 70 and 80 I. Q.

"It is conceded that, in proportion to their number in the community, mentally defective children furnish perhaps ten times their quota of incipient criminals, but in the aggregate the dull-normal group actually furnishes the bulk of children with criminal tendencies.

"Dr. Healy finds that mental capacity or general intelligence is only one of ten factors that may influence a child toward unsocial behavior. The one greatest factor he appears to believe is that of the child's 'mental content, idealation, or imagery'."

Educational Research Association

(Frank N. Freeman, *Secretary and Editor*)

The space assigned to the Educational Research Association is taken up this month with the membership list. Two or three news items which have come in will be put in the next issue. The secretary takes this opportunity again to ask for communications. Three types are suggested: first, personal items of news; second, brief reports of work in progress or of completed studies which are not extensive enough for an article; third, critical discussions of most questions. Let us have a little real criticism. If anybody cannot stand professional, objective criticism he is not a scientist.

It is appropriate in connection with the publication of the membership list to repeat the provision concerning the qualifications for membership. The constitution provides for election by the executive committee "on the presentation of satisfactory evidence in the form of published or unpublished studies which show ability to arrange, organize, and to conduct research . . . " The executive committee usually regards publication as a requisite. If possible, four copies of publications should be submitted with applications. Blanks for application have been printed and will be sent to any member desiring to nominate somebody else for membership or to any person desiring to apply.

As the membership roll lengthens it becomes more difficult to keep it up to date. The secretary especially invites corrections of the following list.

Since there are occasional requests for copies of the membership roll a few reprints of the present list are being made. They may be obtained by addressing the secretary upon the payment of fifteen cents.

LIST OF MEMBERS OF THE EDUCATIONAL RESEARCH ASSOCIATION

Honorary Members

Ayres, L. P., Vice-President Cleveland Trust Co., Cleveland, Ohio.

Cattell, J. M., Garrison-on-Hudson, N. Y.

Chadsey, C. E., Dean of School of Education, University of Illinois, Urbana, Illinois.

Coffman, L. D., President University of Minnesota, Minneapolis, Minn.

Hall, G. Stanley, Clark University, Worchester, Mass.

Hanus, P. H., Professor of Education, Harvard University, Cambridge, Massachusetts.

Judd, C. H., Director of School of Education, University of Chicago, Chicago, Illinois.

Rice, J. M., Germantown, Pennsylvania.

Russell, James E., Teachers College, Columbia University, New York City.

Russell, W. F., Dean of School of Education, University of Iowa, Iowa City, Iowa.

Thorndike, E. L., Professor of Educational Psychology, Columbia University, New York City.

Wissler, E. C., Washington, D. C.

Regular Members

Alexander, Carter, 525 West 120th St., New York City.

Anderson, H. W., Assistant Director, Educational Research, 50 Broadway, Detroit, Michigan.

Ashbaugh, E. J., Assistant Director, Bureau of Educational Research, Ohio State University, Columbus, Ohio.

Baldwin, B. T., Director, Child Welfare Research Station, University of Iowa, Iowa City, Ia.

Ballou, F. W., Supt. of Schools, 1340 Girard St., Washington, D. C.

Barthelmess, Harriet M., Teachers College, Columbia University, 106 Morningside Drive, New York City.

Beeson, M. J., University of Colorado Cooperative Extension, Grand Junction, Colorado.

Brainerd, Mrs. Margaret, Director of Educational Research, Martins Ferry, Ohio.

Branson, E. P., Director, Bureau of Educational Research, City Public Schools, Long Beach, California.

Breed, F. S., University of Chicago, Chicago, Illinois.

Bright, Ira J., Supt. of Schools, Leavenworth, Kansas.

Brown, Emma M., Director, Bureau of Research, Public Schools, Denver, Colorado.

Brueckner, L. J., City Teachers College, Detroit, Michigan.

Buckingham, B. R., Director, Bureau of Educational Research, Ohio State University, Columbus, Ohio.

Buckner, C. A., University of Pittsburgh, Pittsburgh, Pa.

Burgess, Mrs. May A., Dept. of Education, Russell Sage Foundation, 500 West 122nd St., New York City.

Buswell, Guy T., University of Chicago, Chicago, Illinois.

Caldwell, O. W., Lincoln School, Teachers College, Columbia University, New York City.

Charters, W. W., Carnegie Institute of Technology, Pittsburgh, Pa.

Clark, J. R., Teachers College, Columbia University, New York City.

Cobb, Margaret, Institute of Educational Research, Teachers College, Columbia University, New York City.

Colvin, S. S., Brown University, Providence, Rhode Island.

Counts, George S., Yale University, New Haven, Connecticut.

Courtis, S. A., Dean, Teachers College, 246 Eliot St., Detroit, Michigan.

Coxe, W. W., Graduate Student, Ohio State University, Columbus, Ohio.

Cram, F. D., Iowa State Teachers College, Cedar Falls, Iowa.

Cubberley, E. P., Leland Stanford University, Stanford University, Calif.

Daley, H. C., Director, Survey Department, Highland Park, Michigan.

Dalman, M. A., Director, Educational Research, Board of Education, Indianapolis, Indiana.

Davis, Helen, Director, Educational and Mental Measurements, Jackson, Michigan.

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